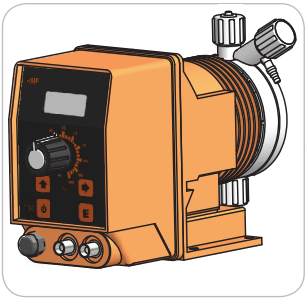
This operating instructions contains safety information that if ignored can endanger life or result in serious injury. They are indicated by this icon.

Use of this pump with radioactive chemicals is forbidden!

Keep the pump protected from sun and water. Avoid water splashes.



OPERATING INSTRUCTIONS MANUAL FOR **KMS MF** - **KMSA MF** - **KMS AC MF** DOSING PUMP

Read Carefully !

ENGLISH Version

R1-02-13

NORME CE
EC RULES (STANDARD EC)
NORMAS DE LA CE

Direttiva Basso Voltaggio
Low Voltage Directive
Directiva de baja tensión
} **2006/95/CE**

Direttiva EMC Compatibilità Elettromagnetica
EMC electromagnetic compatibility directive
EMC directiva de compatibilidad electromagnética
} **2004/108/CE**

Norme armonizzate europee nell'ambito della direttiva
European harmonized standards underdirective
Las normas europeas armonizadas conforme a la directiva
} **2006/42/CE**

This product is tested and certified by "WQA" to conform to NSF/ANSI-50 and NSF/ANSI-61

THIS EQUIPMENT IS FOR DRINKING WATER TREATMENT.

GENERAL SAFETY GUIDELINES

Danger!

In emergencies the pump should be switched off immediately! Disconnect the power cable from the power supply!

When using pump with aggressive chemicals observe the regulations concerning the transport and storage of aggressive fluids!

When installing always observe national regulations!

Manufacturer is not liable for any unauthorized use or misuse of this product that may cause injury, damage to persons or materials.

Caution!

Pump must be accessible at all times for both operating and servicing. Access must not be obstructed in any way!

Feeder should be interlocked with a no-flow protection device.

Pump and accessories must be serviced and repaired by qualified and authorized personnel only!

Always discharge the liquid end before servicing the pump!

Empty and rinse the liquid end before work on a pump which has been used with hazardous or unknown chemicals!

Always read chemical safety datasheet!

Always wear protective clothing when handling hazardous or unknown chemicals!

1. INTRODUCTION

1.1 KMS MF Series

KMS MF is designed for low/middle dosing of chemicals.
The pump has different working modes: Constant, Divide, Multiply, ppm, perc, mlq, batch, volt, mA.

KMS MF has got:
- STAND-BY input
- SEFL (flow sensor) input
- LEVEL input
- ALARM contact output.

Flow rate is determined by the stroke length and by the stroke speed. The stroke length is adjustable from 0 to 100% using the stroke length adjustment knob. However dosing accuracy is guarantee within an adjustment range from 30% to 100%.

All control and setup parameters are available through a digital keyboard and they are displayed on a LCD backlit display.

✎ **Note: some functions described into this manual may need accessories not included into the pump packaging.**

1.2 KMSA MF Series

KMSA MF is the KMS MF version with **self-venting pump head**.
Self-venting pump head must be used when using chemicals that produce gas (i.e. hydrogen peroxide, ammonium, sodium hypoclorite at particular conditions).
For connections ⎘ **"Self-Venting pump head installation".**

1.3 KMS AC MF Series

KMS AC MF is the KMS MF version with **double supply: compressed air and power supply.** Compressed air without lubrifiant and/or condensed water. Air supply pressure range must be from 6 to 10 bar.
For connections ⎘ p. 5.

1.4 Working modes

Pump can work in differents ways:

MODE	WORKING MODES
CONSTANT	Pump doses at a constant rate set in "SPH" (strokes for hour), "SPM" (strokes for minute) or "LPH" (litres per hour) parameters set during program session.
DIVIDE	External pulses from a water meter are divided by a value set during program session. The pump doses with a rate determined by this parameter.
MULTIPLY	External pulses from a water meter are multiplied by a value set during program session. The pump doses with a rate determined by this parameter.
PPM	Dosing rate is determined by pulses from a water meter on the base of set PPM, chemical product concentration (%) and quantity for each single stroke set during program session.
PERC	Dosing rate is determined by pulses from a water meter on the base of set PERC (%), chemical product concentration (%) and quantity for each single stroke set during program session.
MLQ	Dosing rate is determined by pulses from a water meter on the base of set MLQ (milliliters per quintal), chemical product concentration (%) and quantity for each single stroke set during program session.
BATCH	Signal from an external contact starts the pump to dose the set quantity.
VOLT	Voltage from an external device drives the pump that doses proportionally using a minimum and maximum of strokes for minute set during program session (0 ÷ 10 VDC).
mA	Current from an external device drives the pump that doses proportionally using a minimum and maximum of strokes for minute set during program session.

✎ In MULTIPLY, DIVIDE, PPM, PERC, MLQ working modes, the pump, connected to a pulse emitter water meter, shows the instant flow.

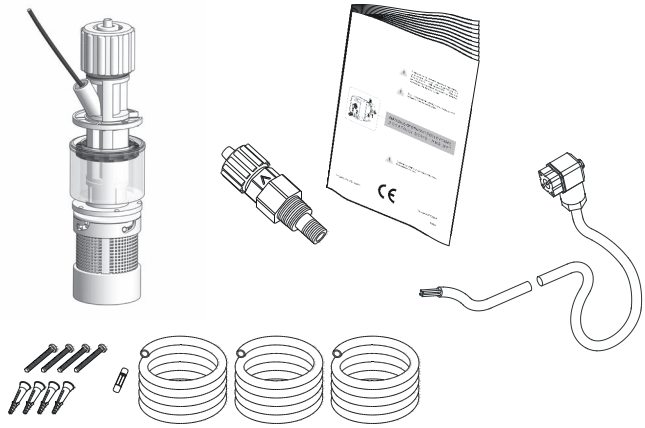
2. UNPACKING

Included into package:

n.4	Dibbles ø6
n.4	Self tapping screws 4,5 x 40
n.1	Delayed fuse 5 X 20
n.1	Foot filter with valve
n.1	Injection valve
n.1	Level probe
m 2	Delivery pipe * (PVDF)
m 2	Suction pipe * (transparent PVC)
m 2	Discharge pipe (transparent PVC)
m 2,5	Signal cable for "Stand-by" and "Alarm"
n.1	This installation manual

* If hose is 6x8 there is only a 4meters long hose. Cut to obtain suction and delivery hoses.

PLEASE DO NOT TRASH PACKAGING.
IT CAN BE USED TO RETURN THE PUMP.



LEGEND:

a. Alternating Current;

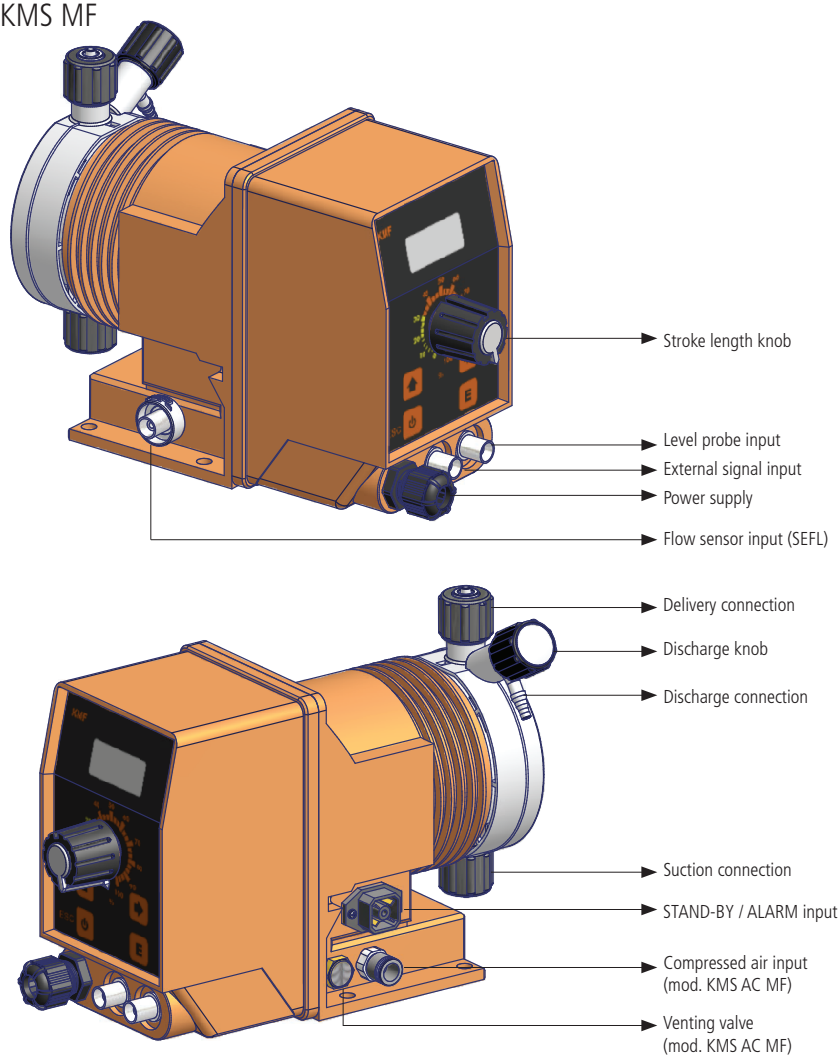
b. DC,

c. Protective Earth;

d. Standby;

e. Warning -

KMS MF



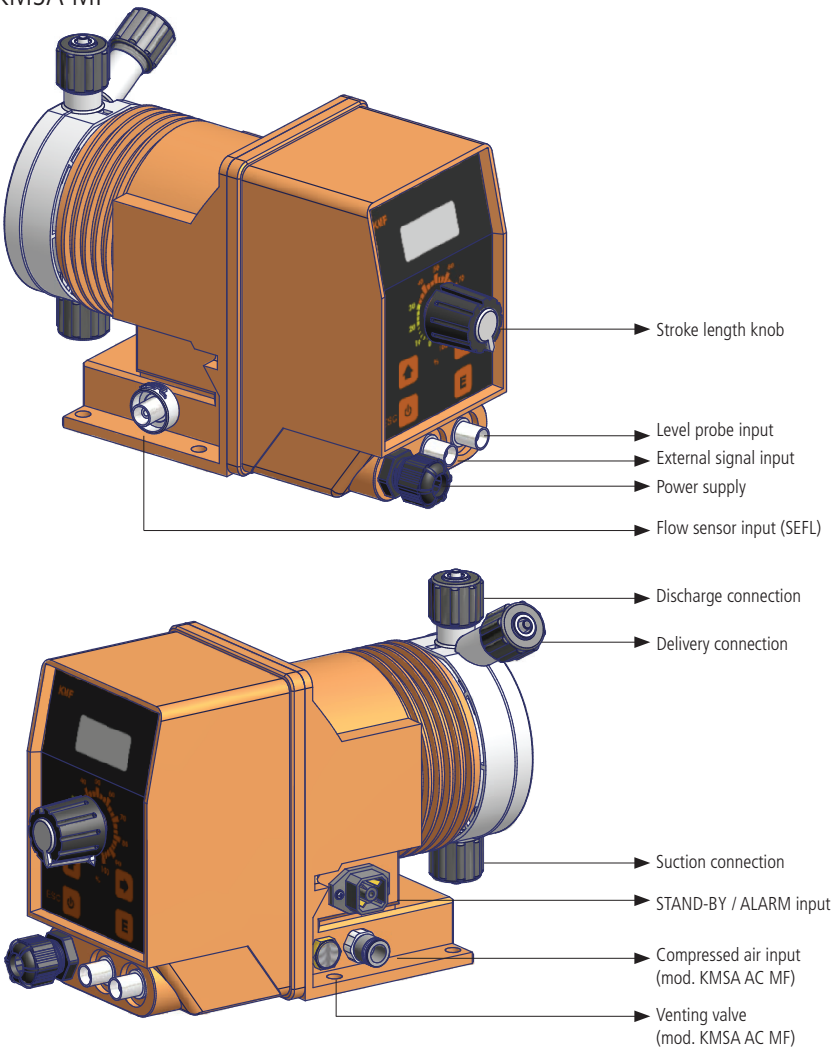
Manual stroke length adjustment

Max CC/stroke (**Construction Materials and Technical info**) are referred to Stroke length knob on 100%.
If Stroke length knob is on 50% cc/stroke will be halved.
To regulate pump's capacity: turn on the pump then press and rotate the knob.

Dosing accuracy is guarantee within an adjustment range from 30% to 100%.

Note: if knob isn't on 100% position then the pump will dose at a pressure greater than the one declared on label.

KMSA MF


Stroke length knob
Level probe input
External signal input
Power supply
Flow sensor input (SEFL)
Discharge connection
Delivery connection
Suction connection
STAND-BY / ALARM input
Compressed air input
(mod. KMSA AC MF)
Venting valve
(mod. KMSA AC MF)

4. BEFORE TO INSTALL WARNINGS

Pump's installation and operativity is made in 4 main steps:

Pump's installation
Hydraulic Installation (hoses, level probe, injection valve)
Electrical Installation (main power connection, SEFL installation, priming)
Programming the pump.

Before to start, please read carefully the following safety information.

Protective clothes

Wear always protective clothes as masks, gloves, safety glasses, ear plugs or ear muffs and further security devices during ALL installation procedure and while handling chemicals.

Installation location

Pump must be installed in a safety place and fixed to the table / wall to avoid vibration problems!

Pump must be installed in a easy accessible place!

Pump must be installed in horizontal position!

Avoid water splashes and direct sun!

Hoses and Valves

Suction and delivery hoses must be installed in vertical position!
All hoses connections must be performed using only hands' force!
No tongs required!

Delivery hose must be firmly fixed to avoid suddenly movements that could damage near objects!

Suction hose must be shorter as possible and installed in vertical position to avoid air bubbles suction!

Use only hoses compatibles with product to dose! See chemical compatibility table. If dosing product is not listed please consult full compatibility table or contact chemical's manufacturer!

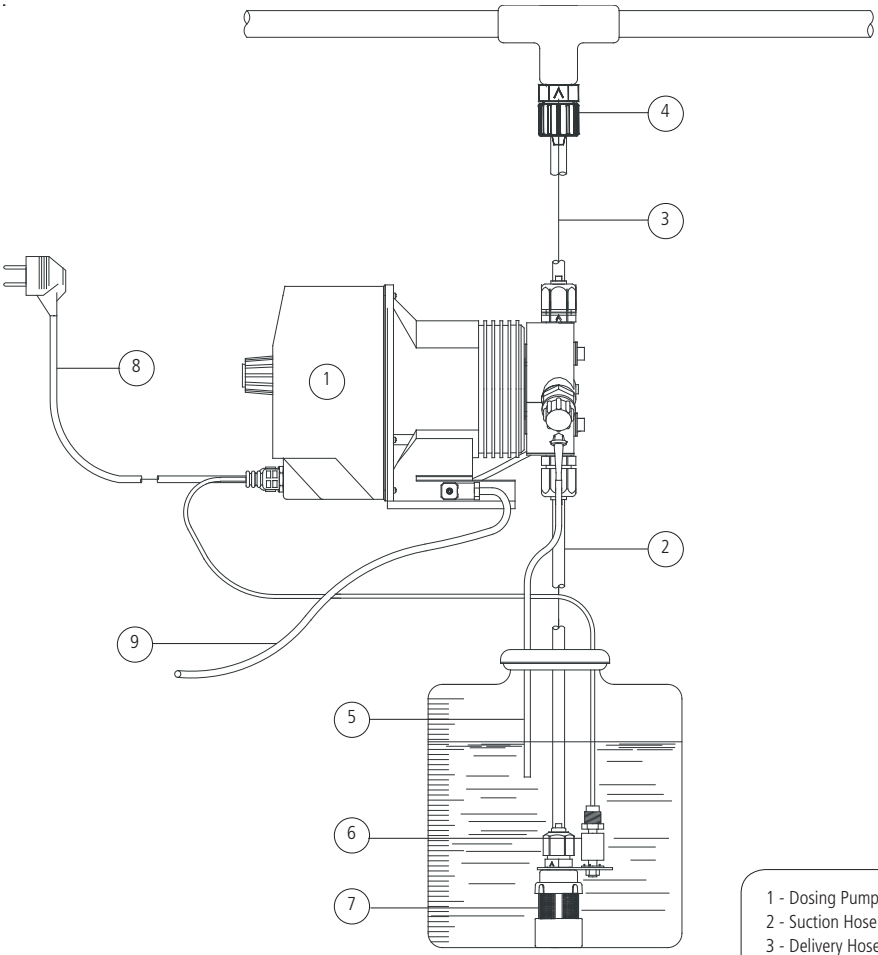
Feeder should be interlocked with a no-flow protection device to automatically shut-off the pumps when there is no flow!

Adequate measures shall be taken to prevent cross connection of chemicals!

Chemical feeding must be stopped during backwash cycles and periods of noflow as these conditions may introduce the potential for chemical overdosing. Not doing so may result in elevated chemical concentrations and hazerdous gas introduction into the pool or spa.

5. INSTALLATION DRAW

Pump must be installed in a stable support (for example a table) at a maximum height (**from tank's bottom**) of **1,5 meters**.



1 - Dosing Pump
2 - Suction Hose
3 - Delivery Hose
4 - Injection Valve
5 - Air discharge
6 - Level Probe
7 - Foot Filter
8 - Power Cable
9 - Standby / Alarm

6. HYDRAULIC INSTALLATION

Hydraulic connections are:

Suction Hose with level probe and foot filter
Delivery Hose with injection valve
Discharge Hose

Suction Hose.

Completely unscrew tightening nut from pump's head and remove assembling components: tightening nut, holding ring and pipe holder.

Assembly as shown in fig. (A). Insert hose into pipe holder until it reaches the bottom.

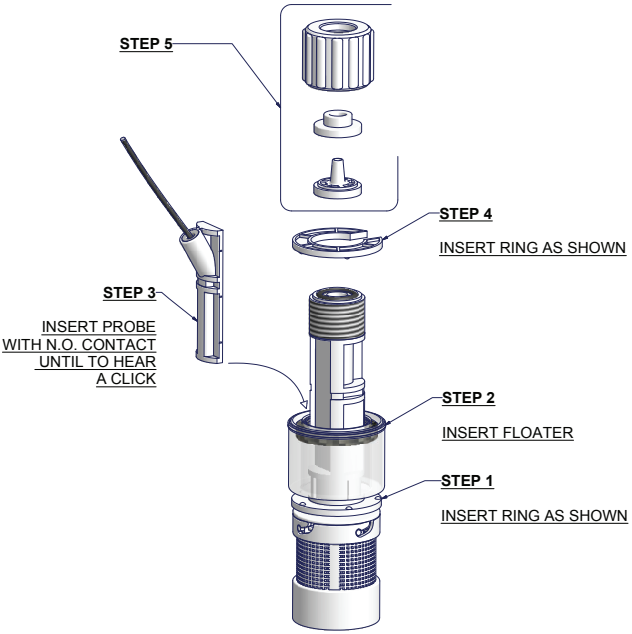
Lock hose on pump's head by screwing down the tightening nut.
Use only hands to do it!

Connect other side of the hose to the foot filter using the same procedure.

fig. (A)

Assembling foot filter with level probe.

Level probe must be assembled with foot filter using the provided kit.
Foot valve is made to be installed into tank's bottom without sediments priming problem.



Connect BNC from level probe into pump's level input (front side of the pump).
Put level probe assembled with foot filter into tank's bottom.

Warning: If there is a mixer installed into tank, install a suction lance instead of level probe / foot filter.

Delivery Hose.

Completely unscrew tightening nut from pump's head and remove assembling components: tightening nut, holding ring and pipe holder.

Assembly as shown in fig. (A). Insert hose into pipe holder until it reaches the bottom.

Lock hose on pump's head by screwing down the tightening nut.
Use only hands to do it!

Connect other side of the hose to the injection valve using the same procedure.

Injection Valve.

Injection valve must be installed on plant from water's input.
Injection valve will open at pressure greater than 0,3bar.

Dicharge hose.

Insert one side of discharge hose into discharge connector as shown in fig (C).

Insert other side of discharge hose into product's tank.
During priming procedure product exceeding will flow into tank.

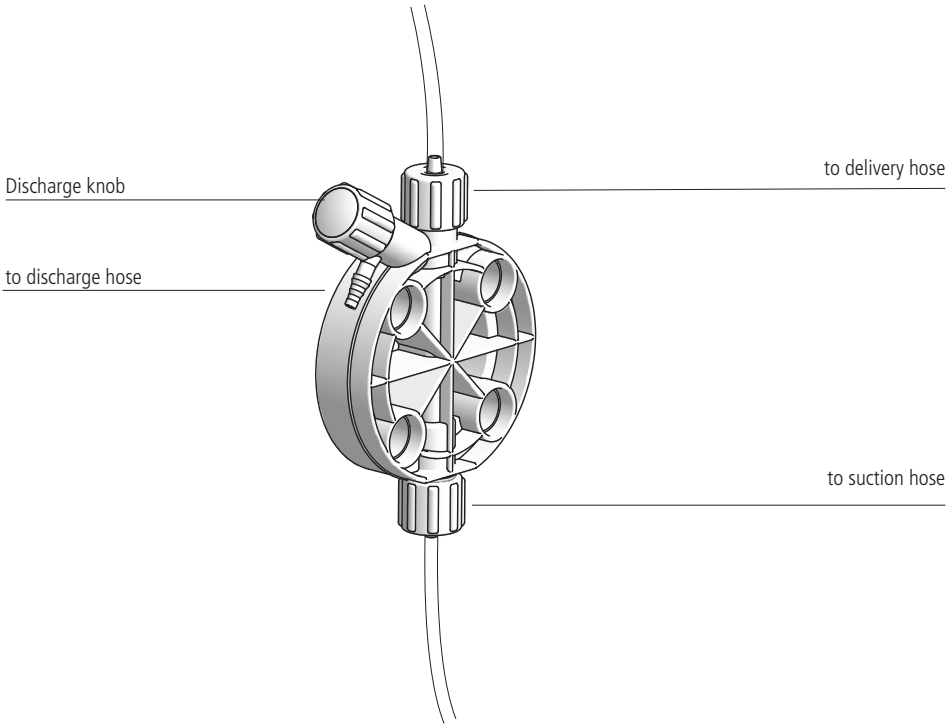
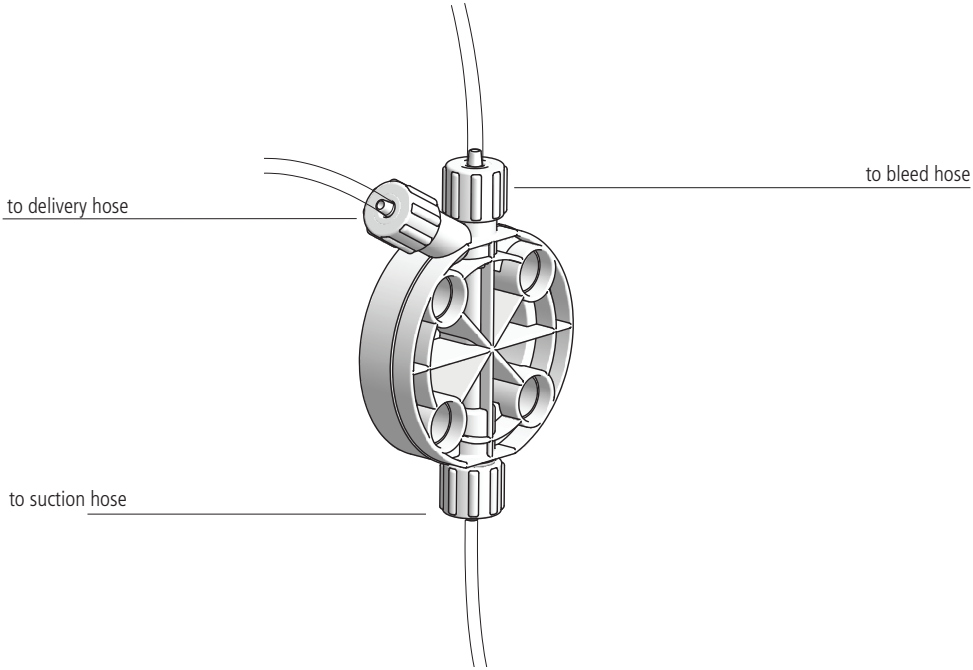


fig (C)

For priming procedure see the paragraph "Priming".

Self-venting pump head.



Self-venting pump head must be used when using chemicals that produce gas (i.e. hydrogen peroxide, ammonium, sodium hypoclorite at particular conditions).

Hoses assembling procedure (including purge hose) is described in fig. (A).

Notes:

- suction, delivery and purge valves are DIFFERENT! Do not exchange them!

- delivery and purge hoses are made of same material!

- it's allowed to lightly bend discharge hose!

- during calibration procedure ("TEST") insert discharge hose into BECKER test-tube!

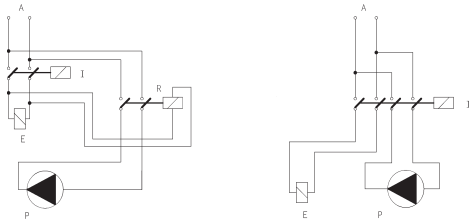
7. ELECTRICAL INSTALLATION

All electrical connections must be performed by AUTHORIZED AND QUALIFIED personnel only.
Before to proceed, please, verify the following steps:

- verify that pump's label values are compatible with main power supply.

- pump must be connected to a plant with a differential switch (0,03A sensitivity) if there isn't a good ground.

- to avoid damages to the pump do not install it in parallel with heavy inductance load (for example: engines). A relay switch must be used. See below picture.



P - Dosing Pump
R - Relay
I - Switch or safety device
E - Electrovalve or inductance load
A - Main Power

WARNING
IF EQUIPMENT <u>IS SUPPLIED</u> WITH A PLUG:

If an appliance coupler or separable plug is used as the disconnecting device, it shall be readily identifiable and easily reached by the operator. For single-phase portable equipment, a plug on a cord of length not greater than 3m is considered to be easily reached.

WARNING
IF EQUIPMENT <u>IS NOT SUPPLIED</u> WITH A PLUG:

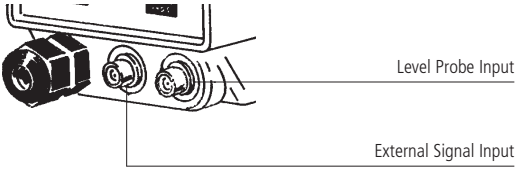
a) a switch or circuit-breaker shall be included in the building installation
b) it shall be in close proximity to the equipment and within easy reach of the operator
c) it shall be marked as the disconnetting device for the equipment

Once verified previous steps proceed as follows:

- check that "BNC" of level probe has been connected as described in "Hydraulic Installation" chapter.

- connect "BNC" and external signal to pump's "INPUT" connectors.
This input may be used as follows:

- as pulse sender water meter or
- as startup contact for "BATCH" mode or
- as voltage input for "VOLT" mode or
- as current input for "mA" mode



- connect alarm and/or stand-by signal as described below fig (D):

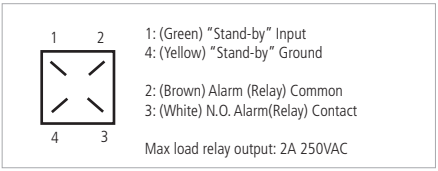


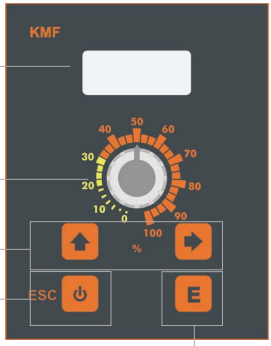
fig (D)

Notes:
- "Alarm" signal isn't fuse protected
- "Standby" signal has main priority on pump's enabling / disabling.

IF NOT USED, PROTECT THE MINI DIN PLUG WITH THE BLACK RUBBER CAP LOOSE IN THE ACCESSORIES BAG.

- proceed to "SEFL" connection (Flow sensor is optional) as described in page 56.

8. BASIC SETTINGS



LCD backlit display

Storke Lenght Knob

Scroll and increase digit

Turn the pump on or off and exit from setup menu (without saving parameters)

Enter / exit from setup menu (saving parameters)

The "KMS MF" pump is equipped with a keyboard.To avoid any misunderstanding during next chapters all keys will be described as shown on this legend:

▲ "UP" key

ON/OFF ESC "ESC" key

▶ "RIGHT" key

E "E" key

Menu navigation:

To enter into programming mode press and keep pressed **"E" key** from main screen (fig.3):

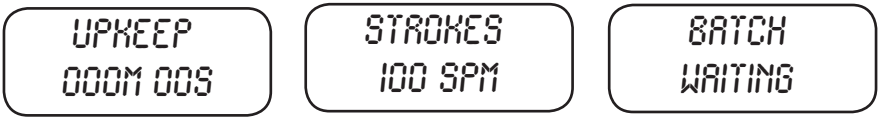


fig.3

Main screen (fig.3) may appear different if "PPM" or "BATCH" mode is enabled. After about 4 seconds the pump will show the password screen (fig.5):

fig.5

Default password is "0000". Just press **"E"** key. Otherwise insert password using **"UP"** and **"RIGHT"** keys.

Saving / Discarding changes / Activating working mode

Once edited data into setup menu it's possible to save them by pressing "E" key or to discard them by pressing "ESC" key.

To activate a working mode (Constant, Divide, Multiply, PPM, PERC, MLQ, Batch, Volt, mA) select the required mode and confirm it using "E" key.

Turning on and off the pump

"ESC" key has a double function. It can be used to discard all changes made into setup mode or to turn on/off the pump. To turn on/off the pump press and keep pressed this key while in main screen (fig.3). The pumps will show:

fig.6

To return into operating mode press "ESC" key.

Alarm output logical working.

The pump has an "Alarm" output that changes its status (from N.O. to N.C. or viceversa) when a signal is received from "LEVEL" and/or "SEFL" and/or "STAND-BY". To set this alarm refer to related chapter.

Full menu / Short Menu mode

When entering into SETUP display shows access mode menu:

If this is the first time into SETUP menu then the pump will automatically set itself into "FULL" menu mode as shown in fig. A. Just press "E" key to confirm. This mode will show all pump functions and working modes.

fig. A

fig. B

Next time the SETUP menu will be reached it will possible to operate with "SHORT" menu configuration to change only selected mode parameters as shown in fig. B. Press "E" to confirm.

Note: "SHORT" menu option is not available during first time into SETUP menu or after a reset.

9. PRIMING

PRIMING

To proceed follow these steps: connect all hoses to the pump; open dischage valve by completely turning the discharging knob (counter clock-wise). Power up the pump and turn stroke lenght knob to 100%. After pump's intro (fig.1):

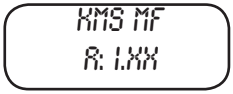


fig.1

the pump will show the "Delay" (pump's activation delay) as shown fig.2:

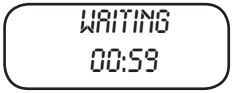


fig.2

Press any key to skip the "Delay". Pump will show "Srokes" (actual strokes) as shown in fig.3:

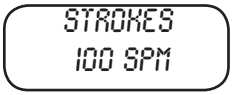


fig.3

In any working mode, if a SEFL is installed and enabled (see SEFL Setup procedure), the display will show the icon (asterisk as in fig. 4):
- if SEFL works correctly, the asterisk blinks to any pulses given by the solenoid;
- if the asterisk does not appear, there is an anomaly (i.e.: hoses and/or valves are obstructed, SEFL in not connected, etc.).

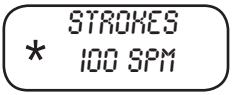


fig.4

Press and keep pressed the "RIGHT" key to enter into priming mode. Pump will go for 30 seconds into priming mode as shown in fig.5.

fig.5

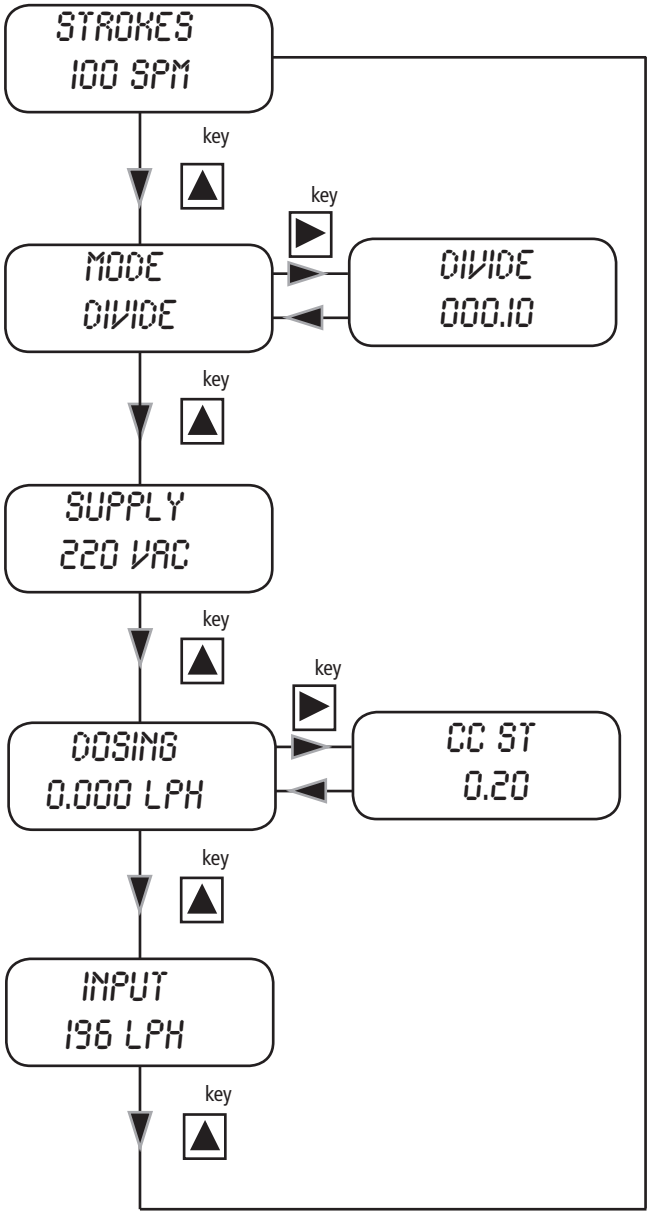
When the chemical begins to flow out from the outgassing hose then completely close the outgassing knob (except for self-venting pump heads). This ends the priming procedure. If countdown for priming is not yet ended press "ESC" key.

Now the pump is operative. Proceed to setup and programming.

10. PUMP'S FUNCTIONS SUMMARY

Pump's functions summary

During pump's working mode is it possible to see furthers working information.
Press more times the "UP" key to cycle through following information:



Working Mode

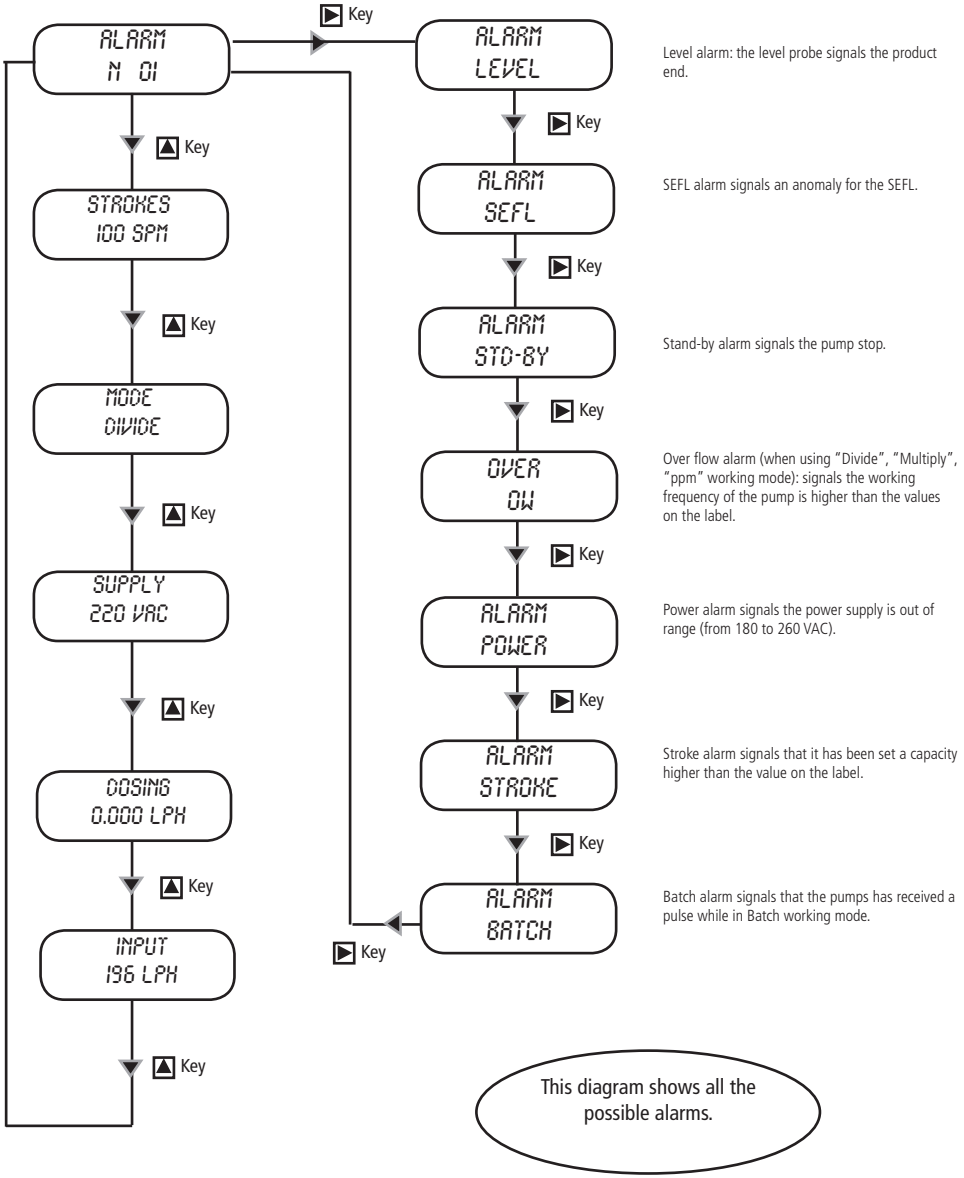
Power Supply Voltage

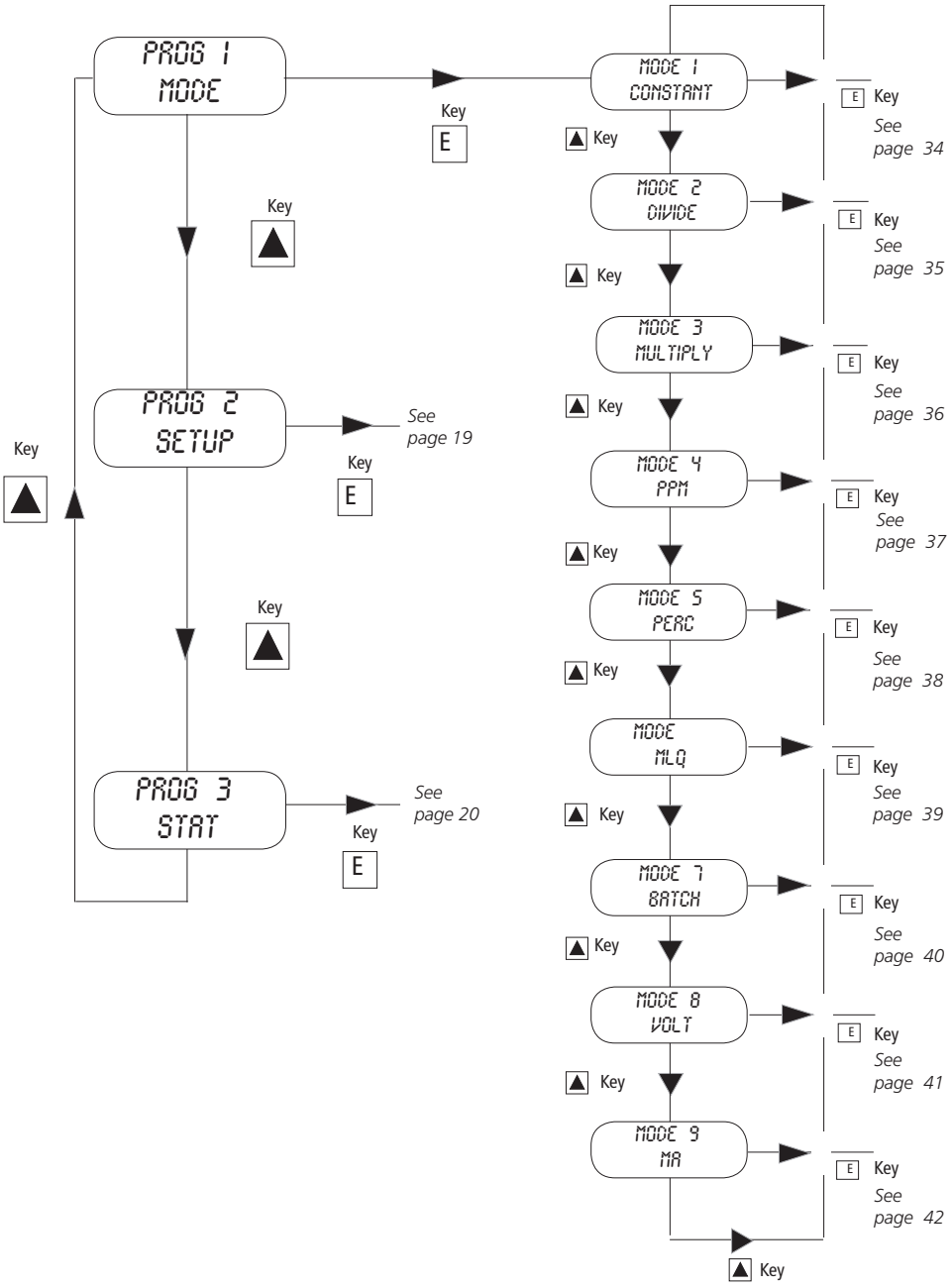
Liters/Hour or Gallons/ Hour Dosage

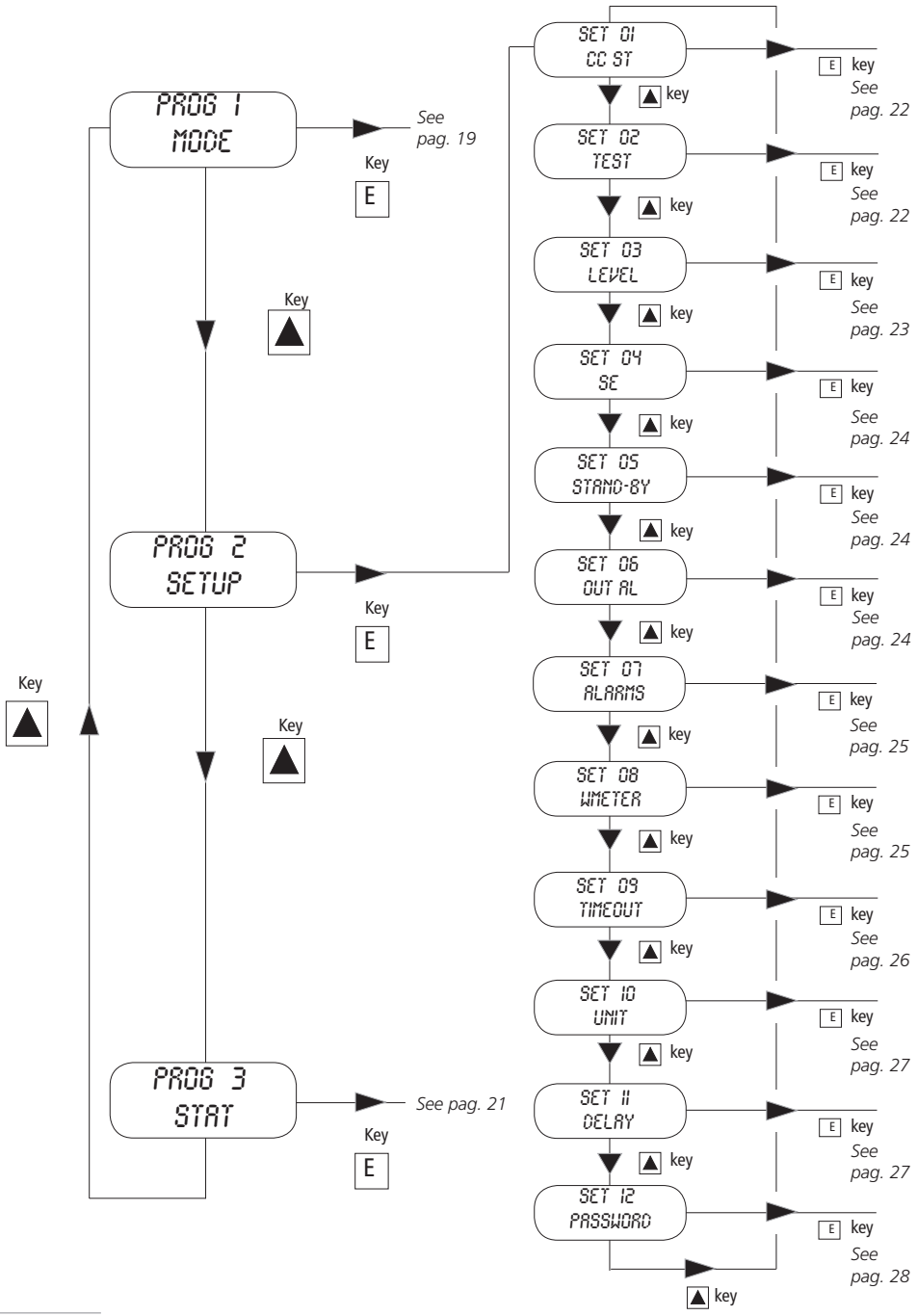
External signal value (in Volt and mA working mode)
or actual system flow (Multiply, Divide and PPM working mode).
This item is not present in Constant working mode.

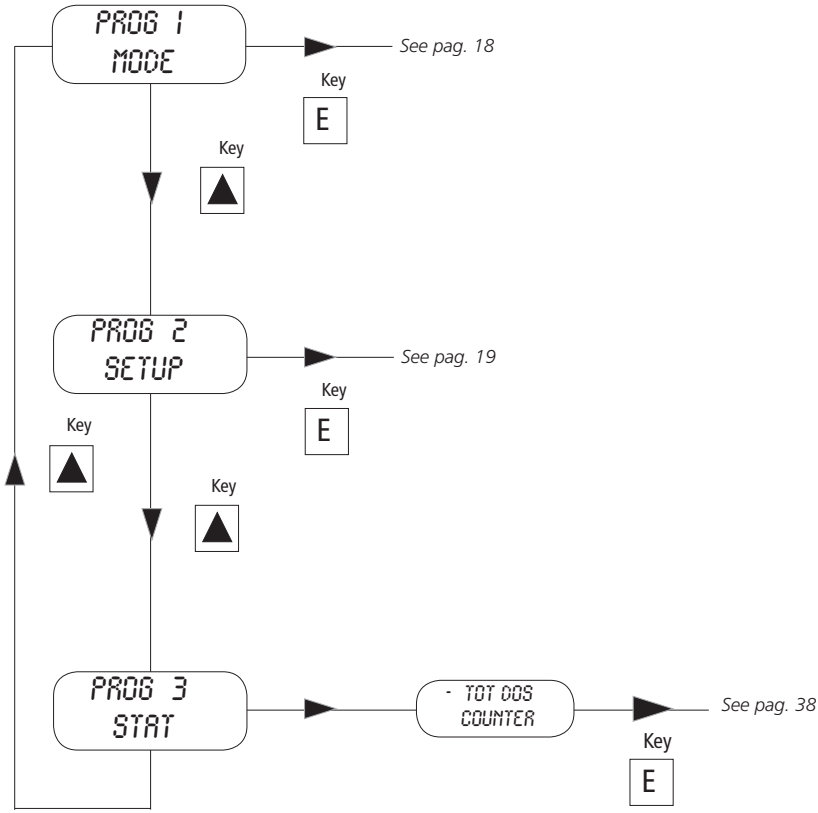
10. PUMP'S FUNCTIONS SUMMARY- ALARMS

If any alarm is active, in the menù "**Pump's functions summary**" a general alarm display will show the **number** of alarm active at the moment. Enter into this menu with "**RIGHT**" key.
The windows displayed show which alarms are active.


ALARM N 01
Key
ALARM LEVEL
Key
ALARM SEFL
Key
ALARM STD-BY
Key
OVER OW
Key
ALARM POWER
Key
ALARM STROKE
Key
ALARM BATCH
Key
STROKES 100 SPM
Key
MODE DIVIDE
Key
SUPPLY 220 VAC
Key
DOSING 0.000 LPH
Key
INPUT 196 LPH
Key
Level alarm: the level probe signals the product end.
SEFL alarm signals an anomaly for the SEFL.
Stand-by alarm signals the pump stop.
Over flow alarm (when using "Divide", "Multiply", "ppm" working mode): signals the working frequency of the pump is higher than the values on the label.
Power alarm signals the power supply is out of range (from 180 to 260 VAC).
Stroke alarm signals that it has been set a capacity higher than the value on the label.
Batch alarm signals that the pumps has received a pulse while in Batch working mode.
This diagram shows all the possible alarms.

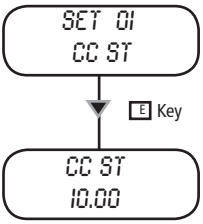

PROG 1
MODE
Key
E
Key
PROG 2
SETUP
See page 19
Key
E
Key
PROG 3
STAT
See page 20
Key
E
Key
MODE 1
CONSTANT
Key
E Key
See page 34
MODE 2
DIVIDE
Key
E Key
See page 35
MODE 3
MULTIPLY
Key
E Key
See page 36
MODE 4
PPM
Key
E Key
See page 37
MODE 5
PERC
Key
E Key
See page 38
MODE
MLQ
Key
E Key
See page 39
MODE 7
BATCH
Key
E Key
See page 40
MODE 8
VOLT
Key
E Key
See page 41
MODE 9
MA
E Key
See page 42
Key


PROG 1
MODE
See pag. 19
Key
E
Key
PROG 2
SETUP
Key
E
Key
Key
PROG 3
STAT
See pag. 21
Key
E
SET 01
CC ST
key
E key
See pag. 22
SET 02
TEST
key
E key
See pag. 22
SET 03
LEVEL
key
E key
See pag. 23
SET 04
SE
key
E key
See pag. 24
SET 05
STAND-BY
key
E key
See pag. 24
SET 06
OUT AL
key
E key
See pag. 24
SET 07
ALARMS
key
E key
See pag. 25
SET 08
WMETER
key
E key
See pag. 25
SET 09
TIMEOUT
key
E key
See pag. 26
SET 10
UNIT
key
E key
See pag. 27
SET 11
DELAY
key
E key
See pag. 27
SET 12
PASSWORD
E key
See pag. 28
key


PROG 1
MODE
See pag. 18
Key
E
Key
PROG 2
SETUP
See pag. 19
Key
E
Key
Key
PROG 3
STAT
- TOT OOS
COUNTER
See pag. 38
Key
E

Pump's initial setup

Apart of choosen working mode, the pump must be prepared to operate by setting the main parameters into "SETUP" menu. To enter into this menu please follow the "Quick Guide through menu" at page 20.



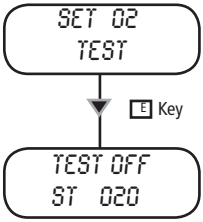
CC per Stroke.

Enter here the cc/stroke value obtained during "Test" mode (calibration).

Use **"UP"** key to increase of one unit the blinking digit "_".

Press **"RIGHT"** key to skip on next digit.

Press **"E"** key to save data and **"ESC"** exit to main menu.
Otherwise press **"ESC"** to discard data and exit to main menu.



Calibration.

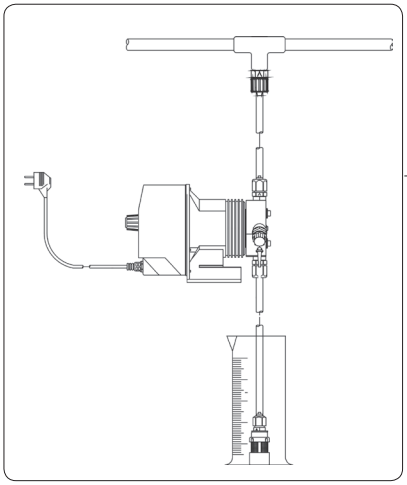
This procedure defines the cc quantity (cubical centimeters) that the pump feed every single injection. To determine this value the pump must be calibrated.

1) Install the pump on plant and insert the suction hose (with its level probe / foot filter) into a BEKER "test-tube".
If pump's model is self-priming put the discharge hose into the "test-tube" too.

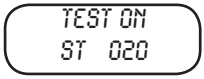
2) Power up the pump and turn the flow's knob to required position.

3) Fill up the "test-tube" with the chemical until to reach a known value.

4) From setup menu choose "TEST", and insert 20". This value is the strokes that the pump will produce during the procedure.



6) Press **"E"**. The pump will begin to produce the 20 strokes and to suck the chemical from the "test-tube".



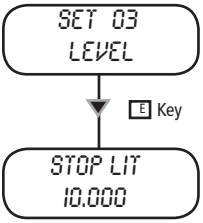
7) At the end of 20 strokes the pump will stop. Read the value of chemical left into "test-tube".

8) Substract the initial value to the left value.

9) Divide the result with the ST value (20).

10) Type this value into "CC/ST" (Set [01]) as previously described.

11) If obtained result is too small or too big, please, try to change strokes value (20).



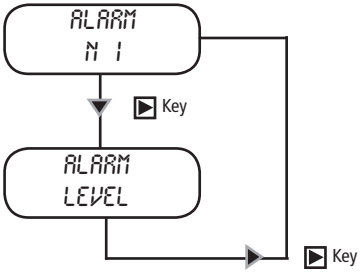
Pre Level Alarm (Reserve).

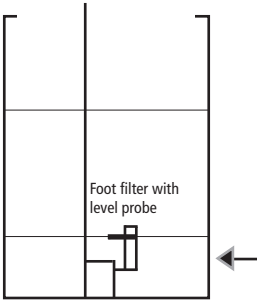
This function defines a pre-alarm status to inform user that the dosing product is near to end. Reserve value to be set, must be calculated on product quantity left between foot filter and pump's suction level.

- Use "UP" key to increase the blinking "_" digit.
-Press "RIGHT" key to skip on next digit.
-Press "E" key to save data and "ESC" exit to main menu.

Otherwise press "ESC" to discard data and exit to main menu.

During the alarm the pump continues to dose but it'll show the following picture:

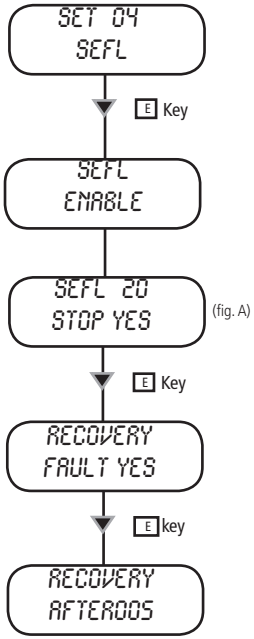




Customizable Reserver (liters / gallons)

Flow Sensor (SEFL).

This function enables an external alarm and, eventually, stops the dosage if the pump does not receive a "confirmation signal" from the "SEFL". ("SEFL" accessories is optional).



- Use "UP" key to increase the blinking "_" digit and set the number of failing strokes before to stop or not the pump. It is possible to set a number from 1 to 99. Setting 00, the SEFL will be disabled (DIS).

-Press "RIGHT" key to skip on next digit.

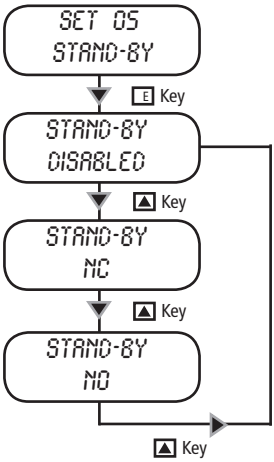
-Press again "RIGHT" key to choose the working procedure.

-Press "UP" key to choose if pump must be stopped after a numbers of pulses (YES) or continue to dose (NO).

- Press "E" key to setup fault recovery (recovery fault) options. Setting "YES" as selected option if the flow sensor will have unreliable strokes it will recover them while flow sensor is still working in synching with it. Set this function by choosing how many unreliable strokes will be needed to recover dosage. If entered value is lower than previous one (fig. A) then SEFL function will be disabled.

While into recovering mode, if there is not synchrony with SEFL, the unreliable strokes numbers will not decrease. The maximum unreliable strokes numbers is determined by the number of failing strokes previuously set. Passing over this value an alarm (ALARM SEFL) will be generated by the pump. Press "UP" to set Recovery fault on NO.

-Press "E" key to save data and "ESC" to exit to main menu. Otherwise press "ESC" to discard data and exit to main menu.

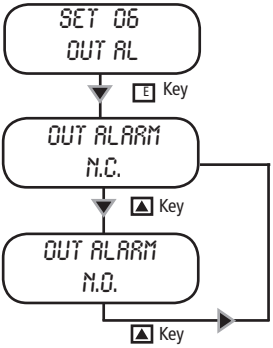


"Stand-By" signal.

This function allows the pump to dose only when an external signal is received from "Stand-by" input. This signal can be enabled as a N.O. contact (Normally Opened) , N.C. contact (Normally Closed) or disabled.

- Use "UP" key to change working mode for "Stand by" signal.

-Press "E" key to save data and "ESC" to exit to main menu. Otherwise press "ESC" to discard data and exit to main menu.

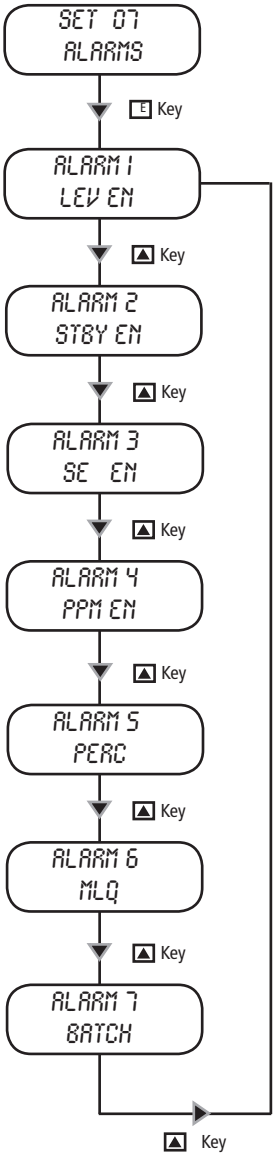


"Out Alarm" signal.

This function allows to manage the alarm output contact . The alarm can be set as "N.O." contact (Normally Open) or "N.C." contact (Normally Closed).

- Use "UP" key to change working mode for "Out Al" signal.

-Press "E" key to save data and exit to main menu. Otherwise press "ESC" to discard data and exit to main menu.



Alarms Management.

Use this function to enable/disable the relay output for level alarm (lev) and/or standby (stby) and/or flow sensor (sefl) and/or ppm and/or percentage (PERC) and/or MLQ and/or Batch.

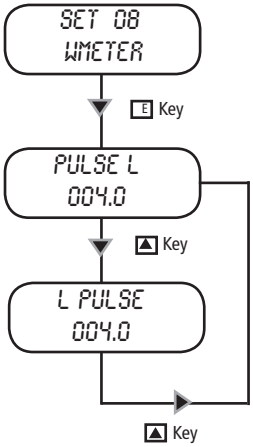
If alarm is activated for one or more events then the output relay will be enabled, the pump will show the alarm status and it'll stop or not the dosing activity.

If alarm is not activated for one or more events then the output relay will be disabled, the pump will show the alarm status and it'll stop or not the dosing activity.

- Use **"UP"** key to choose the alarm to set.

-Use **"RIGHT"** key to enable (EN) or disable (DI) the alarm.

-Press **"E"** key to save data and **"ESC"** to exit to main menu. Otherwise press **"ESC"** to discard data and exit to main menu.



Water Meter Setup.

Use this function to setup the water meter information.

By entering the amount of pulses produced by the water meter the pump will optimize the working mode when programmed to work in ppm and update the stats menu.

- Use "UP" key to choose from "Pulse/L" (pulse/liter) or "L/Pulse" (liter/pulse).

Choose "Pulse/L" for a water meter that produces many pulses.

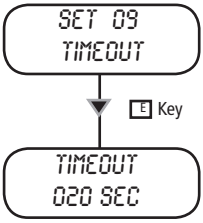
Choose "L/Pulse" for a water meter that produces few pulses.

Setting "000.0", the pump does not accept the signal and it is not possible to save the data.

- Use **"UP"** key to increase the blinking "_" digit. Enter number of pulses that pump must receive to stop or not the pump.

-Press **"RIGHT"** key for next digit / field.

-Press **"E"** key to save data and **"ESC"** to exit to main menu. Otherwise press **"ESC"** to discard data and exit to main menu.



Pulses Timeout (only for "Multiply" working mode and "PPM", "PERC" and "MLQ" working mode when the result is a multiplication).

When the pump receives a pulse from the water meter it starts the dosing activity through an amount of time (from the first pulse to the following one). At the beginning the pump doesn't know the time lapse between the first and the second pulse. So it'll dose the product in the fastest way. From the second pulse, the pump will dose the product correctly.

This function set the maximum time between a pulse and the following one. Once that this time is exceeded the pump will reinitialize the dosing activity as the first time that a pulse has been received.

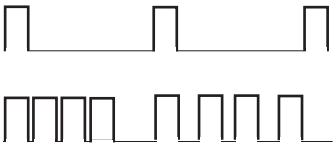
Default value is 120 seconds.
To set "Timeout" function, between the minimum (1 sec.) and the maximum (999 sec.), proceed as follow:

- Use **"UP"** key to increase the blinking "_" digit. Enter number of pulses that pump must receive to stop or not the pump.

-Press **"RIGHT"** key for next digit / field.

-Press **"E"** key to save data and **"ESC"** to exit to main menu. Otherwise press **"ESC"** to discard data and exit to main menu.

Pulses Timeout does not take part in "Divide" working mode and in all working modes when the result is a division.

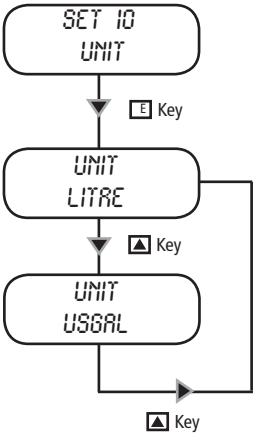


External Pulses

The first time that the pump receives a pulse it doesn't know the the time between this pulse and the following one. So the pump will run faster as possible. "Timeout" function forces the pump to work in this way, once a specified amount of time has been exceeded.

After second pulse the pump will know the time between a pulse and the following one.

So it'll dose optimizing the dosage through the time.

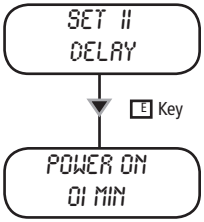


Unit Change.

This function allows to choose between liters or gallons measurement unit.

-Use **"UP"** key to switch between liter or gallons measurement unit.

-Press **"E"** key to save data and **"ESC"** to exit to main menu. Otherwise press **"ESC"** to discard data and exit to main menu.



Startup Delay Setup.

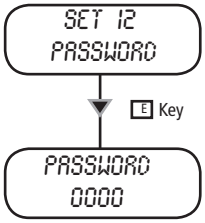
When the pump is powered is it possible to have a delay time (from 0 to 10 minutes) before dosing activities.

-Use **"UP"** key to choose the alarm to set.

-Use **"RIGHT"** key for next digit.

-Press **"E"** key to save data and **"ESC"** to exit to main menu. Otherwise press **"ESC"** to discard data and exit to main menu.

Note: Press any key during delay time to skip it.



Password Setup.

"Setup" menu is password protected. Default value to enter into "setup" menu is "0000" (only numeric units). To change this password proceed as follows:

- Use **"UP"** key to change first digit.

-Press **"RIGHT"** key to move cursor over next digit.

-Press **"E"** key to save data and **"ESC"** to exit to main menu. Otherwise press **"ESC"** to discard data and exit to main menu.

Note: For lost password, please, follow the "Load default" procedure.

16. "LOAD DEFAULT" AND "RESET PASSWORD" PROCEDURE

"LOAD DEFAULT" procedure

This procedure deletes all programming data set. It reloads the default data of the pump.

Follow this instructions:

- unplug power supply;

- pressing both "UP" and "RIGHT" keys, plug in power supply.

For few seconds, the display shows LOAD DEFAULT before start up the pump.

"RESET PASSWORD" procedure

This procedure resets the password set and reloads the default password of the pump ("0000").

Follow this instructions:

- unplug power supply;

- pressing both "UP" and "ESC" keys, plug in power supply.

For few seconds, the display shows RESET PASSWORD before start up the pump.

17. WORKING PROCEDURE SETUP

Introduction.

"MF" pump can work in different modes.

CONSTANT mode.

Pump doses at a constant rate set in "SPH" (strokes for hour), "SPM" (strokes for minute) or "LPH" (litres per hour) parameters set during program session.

When to use this mode ?
This mode is useful when there isn't an input signal to control the dosing activity. Pump doses requested product quantity in constantly.

Which parameters must be set ?
SPH (strokes per hour), SPM (strokes per minute) LPH (litres per hour)

DIVIDE mode.

External pulses from a water meter are divided by a value set during program session. The pump doses with a rate determined by this parameter.

When to use this mode ?
This mode is useful using an external signal from a pulse sender water meter that produces elevated quantities of pulses. Pump divides these pulses to allow a correct dosing activity.

Which parameters must be set ?
DIVIDE (division factor)

MULTIPLY mode.

External pulses are multiplied by a value set during program session. The pump doses with a rate determined by this parameter.

When to use this mode ?
This mode is useful using an external signal from a pulse sender water meter that produces low quantities of pulses. Pump multiplies these pulses to allow a correct dosing activity.

Which parameters must be set ?
MULTIPLY (multiply factor)
TIMEOUT

PPM mode.

Dosing rate is determined by pulses from a water meter, desired concentration in PPM, chemical product concentration (%) and quantity for each single stroke set during program session.

When to use this mode ?
This mode is useful using an external signal from a pulse sender water meter and it's necessary to specify only PPM (parts per million) and product concentration, leaving the pump to manage coming pulses.

Which parameters must be set ?
PPM (parts per million product quantity)
CONC (% of product's concentration)
Water Meter Pulses
CC/Stroke
TIMEOUT

PERC mode.

Dosing rate is determined by pulses from a water meter, percentage (%), chemical product concentration and quantity for each single stroke set during program session.

When to use this mode ?
This mode is useful using an external signal from a pulse sender water meter and it's neces--sary to specify only % , leaving the pump to manage coming pulses.

Which parameters must be set ?
% (percentual product to dose)
CONC (percentual of product concentration)
Water Meter Pulses
CC/STROKE
TIMEOUT

Product quantity to dose:

$$\frac{\text{(percentual product to dose * pump capacity l/h)}}{\text{Percentual of product concentration}}$$

Water meter:
Use a water meter to reach its maximum pulsating capabilities.
Note: maximum frequency for this pump is 1Khz (1000 pulses per second).

MLQ mode.

Dosing rate is determined by pulses from a water meter on the base of set MLQ (mil liliters per quintal), chemical product concentration (%) and quantity for each single stroke set during program session.

When to use this mode ?
This mode is useful when with an external signal from a pulse sender (as a water meter), it is necessary to dose the product quantity set specifing the MLQ (milliliters per quintal) and leaving the pump to manage the coming pulses.

Which parameters must be set ?
MLQ (product quantity in milliliters per quintal)
CONC (% of product's concentration): set 100% if product is pure
Water Meter Pulses
CC/Stroke
TIMEOUT

BATCH mode.

Signal from an external contact starts the pump to dose product or to produce an amount of strokes set during program session.

When to use this mode ?
This function allows to begin dosing activities when pump receives an external signal.

Which parameters must be set ?
ST (strokes)
CC (product's quantity to dose)

VOLT mode.

Voltage from an external device drives the pump that doses proportionally using a minimum and maximum of strokes for minute set during program session.

When to use this mode ?
This mode is used with controllers provided of a proportional output in voltage.

Which parameters must be set ?
HIV (maximum tension)
LOV (minimum tension)
SPM (strokes per minute)

mA mode.

Current from an external device drives the pump that doses proportionally using a minimum and maximum of strokes for minute set during program session.

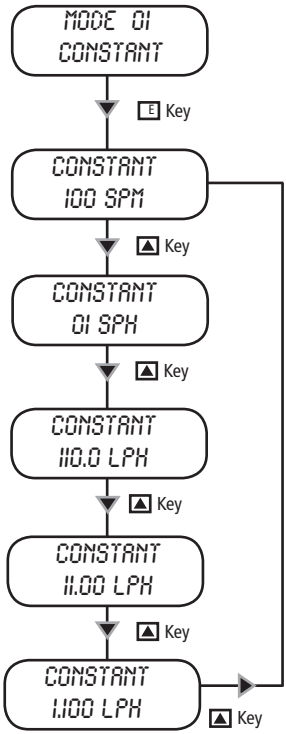
When to use this mode ?
This mode is used with controllers provided of a proportional output in current.

Which parameters must be set ?
HImA (maximum current)
LOmA (minimum current)
SPM (strokes per minute)

CONSTANT mode.

Pump doses at a constant rate set in "SPH" (strokes for hour), "SPM" (strokes for minute), "LPH" (litres per hour) parameters set during program session.

Which parameters must be set ?
SPH (strokes per hour), SPM (strokes per minute), LPH (litres per hour).



Choose "CONSTANT" working mode: "SPH" (strokes per hour), "SPM" (strokes per minute), "LPH" (litres per hour).

Use **"UP"** key to choose between these two modes. Use **"RIGHT"** key to change value. For next digit press again "RIGHT" key.

"LPH" value accuracy depends on cc/st value set into the Setup menu (SET [01] CC/ST).
LPH max value depends on the max frequency of the pump (refer to the pump's label). If an higher value is set, the pump will show an alarm message (ALARM STROKE).

Press **"E"** key to save data and "**ESC**" to exit to main menu. Otherwise press **"ESC"** to discard data and exit to main menu.

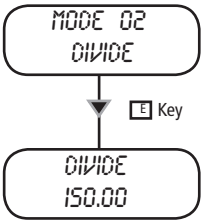
Note: last mode displayed before press the "E" key will be the active one.

19. "DIVIDE" WORKING MODE

DIVIDE mode.

External pulses are divided by a value set during program session. The pump doses with a frequency determined by this parameter.

Which parameters must be set ?
DIVIDE (divisor factor)



Use this mode if connected pulse sender water meter produces many pulses and pump must divide them for correct dosing activities. See formula below to verify this value.

Minimum value accepted is 001.00. Setting a lower value the pump does not save the data.

Use **"UP"** key to modify the value. Press **"RIGHT"** key to move on next digit.

Press **"E"** key to save data and "**ESC**" to exit to main menu. Otherwise press **"ESC"** to discard data and exit to main menu.

Use the following formula to find the divider to keep desired concentration.

$$\left(\frac{[imp/l] \times [cc]}{[ppm] \times [K]} \right) \times 1000 = N$$

N - divisor value to enter into the pump
[imp/l]- pulses/liter from pulse sender water meter
[cc] - single injection quantity of dosing pump
[ppm] - part per millions product quantity to dose (gr/m^3)
[K] - product dilution coefficient.

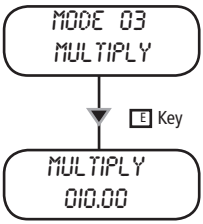
If obtained "N" is < 1 then install a pulse sender water meter that produces more pulses. Otherwise use the "MULTIPLY" mode and multiply for 1/N. It's also possible to fix the problem trying to decrease product dilution.

20. "MULTIPLY" WORKING MODE

MULTIPLY mode.

External pulses are multiplied by a value set during program session. The pump doses with a frequency determined by this parameter.

Which parameters must be set ?
MULTIPLY (multiply factor)
TIMEOUT



Use this mode if: connected pulse sender water meter produces few pulses and pump must multiply them for correct dosing activities. See formula below to verify this value.

Minimum value accepted is 001.00. Setting a lower value the pump does not save the data.

Use **"UP"** key to modify the value. Press **"RIGHT"** key to move on next digit.

Press **"E"** key to save data and "**ESC**" to exit to main menu. Otherwise press **"ESC"** to discard data and exit to main menu.

Use the following formula to find the divider to keep desired concentration.

$$\left(\frac{[ppm] \times [K]}{([imp/l] \times [cc]) \times 1000} \right) = N$$

N - multiplier value to enter into the pump
[imp/l]- pulses/liter from pulse sender water meter
[cc] - single injection product quantity of dosing pump
[ppm] - part per millions product quantity to dose (gr/m^3)
[K] - product dilution coefficient.

If obtained "N" is < 1 then install a pulse sender water meter that produces less pulses. Otherwise use the "DIVIDE" mode and divice for 1/N. It's also possible to fix the problem trying to decrease product dilution.

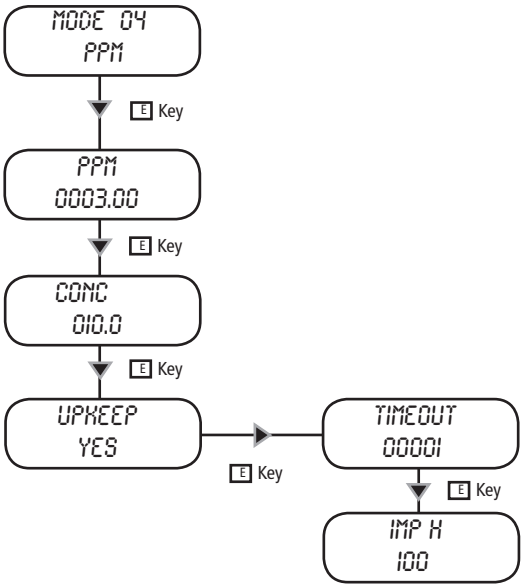
Note: before to use this mode please set the "TIMEOUT" parameter as described at page 26.

21. "PPM" WORKING MODE

PPM mode.

Dosing rate is determined by pulses from a water meter, PPM, chemical product (%) concentration and quantity for each single stroke set during program session.

Which parameters must be set ?
PPM (parts per million product quantity)
CONC (% of product's concentration)
TIMEOUT
WMETER (pulse sender water meter)
CC/ST (see related page)



Use "UP" key to change selected unit ("_" blinking cursor) of PPM.

To move on next digit press "RIGHT" key.

To modify quantity of product concentration press "E" key.

Use "UP" key to change selected unit ("_" blinking cursor) of CONC%.

To move on next digit press "RIGHT" key.

Press "E" key to save data and "ESC" to exit to main menu. Otherwise press "ESC" to discard data and exit to main menu.

To change "TIMEOUT" option, pump activation without external pulses for a set time, choose "YES" from "UPKEEP" menu. Then set pulses/hour to dose at the end of set time.

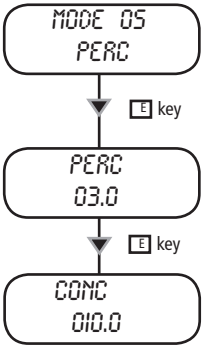
Note: before to use this mode we suggest to set the "TIMEOUT" parameter. "TIMEOUT" take part when the result is a multiplication.

22. "PERC" WORKING MODE

PERC mode.

Dosing rate is determined by pulses from a water meter, percentage (%), chemical product concentration and quantity for each single stroke set during program session.

Which parameters must be set ?
% (percentage of product quantity to dose)
CONC (% of product's concentration): set 100% if product is pure
CC/STROKE (refer to CC/ST setup)
WMETER (water meter)
TIMEOUT



Selectionable from 0.1 to 100.0%

Use "UP" key to change selected unit ("_" blinking cursor) of PPM.

To move on next digit press "RIGHT" key.

To modify quantity of product concentration press "E" key.

Use "UP" key to change selected unit ("_" blinking cursor) of CONC%.

To move on next digit press "RIGHT" key.

Press "E" key to save data and "ESC" to exit to main menu. Otherwise press "ESC" to discard data and exit to main menu.

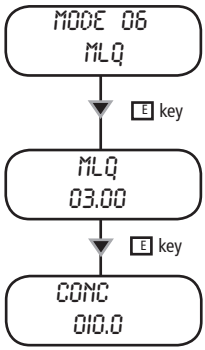
Note: before to use this mode we suggest to set the "TIMEOUT" parameter.
"TIMEOUT" take part when the result is a multiplication.

23. "MLQ" WORKING MODE

MLQ mode.

Dosing rate is determined by pulses from a water meter on the base of set MLQ (milli liters per quintal), chemical product concentration (%) and quantity for each single stroke set during program session.

Which parameters must be set ?
MLQ (product quantity in milliliters per quintal)
CONC (% of product's concentration): set 100% if product is pure
CC/STROKE (refer to CC/ST setup)
WMETER (water meter)
TIMEOUT



Use "UP" key to change selected unit ("_" blinking cursor) of MLQ.

To move on next digit press "RIGHT" key.

To modify quantity of product concentration press "E" key.

Use "UP" key to change selected unit ("_" blinking cursor) of CONC%.

To move on next digit press "RIGHT" key.

Press "E" key to save data and "ESC" to exit to main menu. Otherwise press "ESC" to discard data and exit to main menu.

Note: before to use this mode we suggest to set the "TIMEOUT" parameter.
"TIMEOUT" take part when the result is a multiplication.

24. "BATCH" WORKING MODE

BATCH mode.

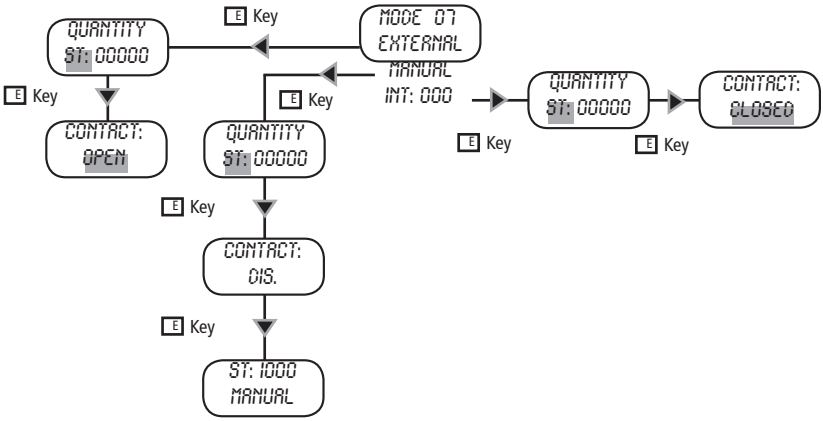
Signal from an external contact starts the pump to dose the needed quantity set during program session or for the set number of strokes.

When to use this mode ?

This function allows to begin dosing activities when pump receives an external signal or to dose in WORK-PAUSE mode.

Which parameters must be set ?

MODE (EXTERNAL - MANUAL - INTERNAL)
ST (strokes)
CC (product's quantity to dose only if programmed to feed a set amount of chemical)
CC/STROKE (see "setup CC/ST")
CONTACT (OPEN or CLOSED)



Choose working mode:

EXTERNAL: Pump doses within an amount of time if an external signal is received. External contact can be set as OPEN (normally open) or CLOSED. (normally closed). Press **"E"** from main mode, choose to dose in ST or CC using **"UP"** key. Set quantity dose and press **"E"** to continue. Define contact type using **"UP"** key. Press "E" to end procedure.

MANUAL: Pomp doses at the end of procedure. Press "E" from main mode, choose to dose in ST or CC using "UP" key. Set quantity to dose. Press "E" to continue, review contact status and press "E". Pump will begin to dose immediately showing quantity left.

INTERNAL: This is a "WORK-PAUSE" mode. Dosing will start for set CC or ST quantity and will stop for set time. Press **"E"** from main mode, choose to dose in ST or CC using **"UP"** key. Set quantity dose and press **"E"** to continue. Define contact type (OPEN or CLOSED) using **"UP"** key. Press "E" to end procedure.

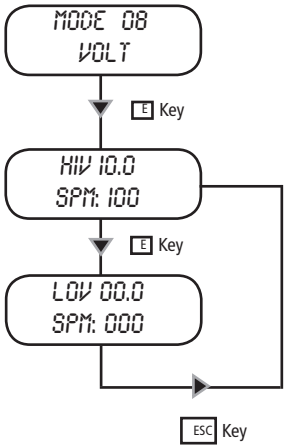
NOTE: Pump must be calibrated ("TEST" function) in order to work properly into this mode. It's not possible to program the pump for both modes. Last entry overwrite previous ones.

25. "VOLT" WORKING MODE

VOLT mode.

Voltage from an external device drives the pump that doses proportionally using a minimum and maximum of strokes for minute set during program session.

Which parameters must be set ?
HIV (maximum tension)
LOV (minimum tension)
SPM (strokes per minute)



To work in this mode is necessary to specify the "HIV" (maximum working tension), "LOV" (minimum working tension) and "SPM" (strokes per minute) values that pump will produce between the parameters.

To setup this values enter into "VOLT" mode. The cursor will blink on first digit ("HIV" field). Insert maximum tension value that will be supplied to the pump (**"UP"** key). To move on next digit press **"RIGHT"** key.

The cursor will blink on "SPM" field. Insert strokes per minute that pump will produce near "HIV" value (**"UP"** key). To move on next digit press **"RIGHT"** key.

Press **"E"** key to move on "LOV".

The cursor will blink on first digit ("LOV" field). Insert minimum tension value that will be supplied to the pump (**"UP"** key). To move on next digit press **"RIGHT"** key.

The cursor will blink on "SPM" field. Insert strokes per minute that pump will produce near "LOV" value (**"UP"** key). To move on next digit press **"RIGHT"** key.

Press **"E"** key to save data and "ESC" to exit to main menu. Otherwise press **"ESC"** to discard data and exit to main menu.

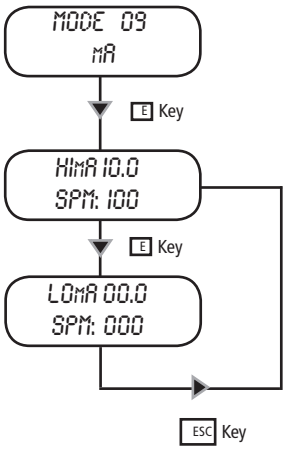
Attention: if a wrong data is set (for example, it has been set the same value for HIV and LOV) an error message (WRONG ENTRY) will appear.

26. "MA" WORKING MODE

mA mode.

Current from an external device drives the pump that doses proportionally using a minimum and maximum of strokes for minute set during program session.

Which parameters must be set ?
HImA (maximum current)
LOmA (minimum current)
SPM (strokes per minute)



To work in this mode is necessary to specify the "HImA" (maximum working current), "LOmA" (minimum working current) and "SPM" (strokes per minute) values that pump will produce between the parameters.

To setup this values enter into "mA" mode. The cursor will blink on first digit ("HImA" field). Insert maximum current value that will be supplied to the pump (**"UP"** key). To move on next digit press **"RIGHT"** key.

The cursor will blink on "SPM" field. Insert strokes per minute that pump will produce near "HImA" value (**"UP"** key). To move on next digit press **"RIGHT"** key.

Press **"E"** key to move on "LOmA".

The cursor will blink on first digit ("LOmA" field). Insert minimum current value that will be supplied to the pump (**"UP"** key). To move on next digit press **"RIGHT"** key.

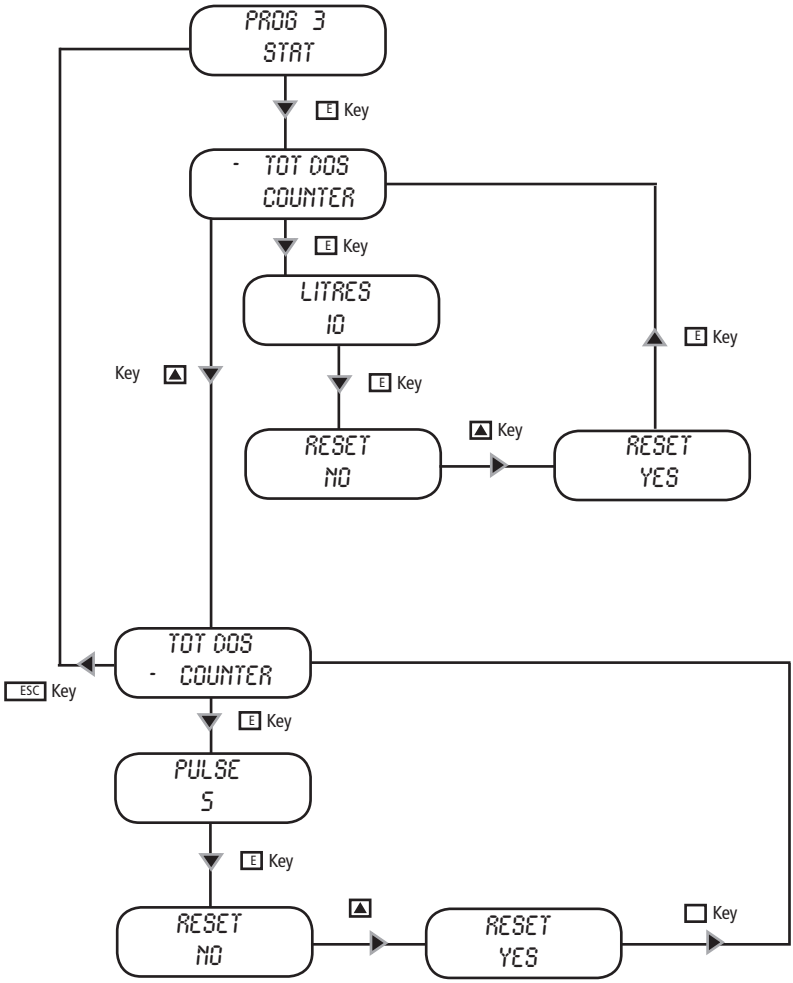
The cursor will blink on "SPM" field. Insert strokes per minute that pump will produce near "LOmA" value (**"UP"** key). To move on next digit press **"RIGHT"** key.

Press **"E"** key to save data and "ESC" to exit to main menu. Otherwise press **"ESC"** to discard data and exit to main menu.

Attention: if a wrong data is set (for example, it has been set the same value for HIV and LOV) an error message (WRONG ENTRY) will appear.

Stat.

To see dosing statistics choose "STAT" from main menu. See quick guide at pag. 21



"TOT DOS" means total dosed product since pump last reset.
"COUNTER" means strokes numbers since pump last reset.

Problem	Possible Cause
Pump doesn't turn on.	Pump isn't powered. Connect it to main supply. Pump's protection fuse is broken. Replace it. See page 45 for replacement procedure. Pump's main board is broken. Replace it. See page 45 for replacement procedure.
Pump is not dosing and solenoid is operating.	The foot filter is obstructed. Clean it. Suction hose is empty. Pump must be primed. Repeat priming procedure. Air bubbles inside hydraulic circuit. Check valves - hoses - fittings. Product to dose is generating gas. Turn discharge knob and let air flow away. Use a self-venting pump head.
Pump is not dosing and solenoid isn't operating or slightly operating.	Crystals presence inside valves. Check them and try to dose 2-3 liters of normal water. Change valves. Injection valve obstructed. Change it.
Pump's display shows "ERROR MEM" o "ERROR DATA"	ERROR MEM: error in data storage. it is necessary to reload pump's default data, as described in "Load default procedure" on page 28. ERROR DATA: error in data setting. Check the values set. If they are correct, but the message still appears, the pump is underdimensioned.

29. FUSE AND MAIN BOARD REPLACEMENT

Fuse or main board replacement is allowed to qualified personnel only. Before to operate disconnect the pump from main power and all hydraulic connections.

For fuse replacement is necessary to use a 3x16 and 3x15 screwdriver and a new fuse (same model of old one).

For main board replacement is necessary to use a 3x16 and 3x15 screwdriver and a new main board (same model of old one).

Fuse replacement procedure:

- Turn pump's injection knob on 0%.

- Remove 6 screws from pump's back.

- Pull pump's back cover until it's completed separated from pump's front. Be careful of the knob's spring.

- Locate the blown fuse and replace it.

- Reassemble the pump. Be careful to put back the knob's spring.

- Reinsert screws.

Main board replacement procedure:

- Turn pump's injection knob on 0%.

- Remove 6 screws from pump's back.

- Pull pump's back cover until it's completed separated from pump's front. Be careful of the knob's spring.

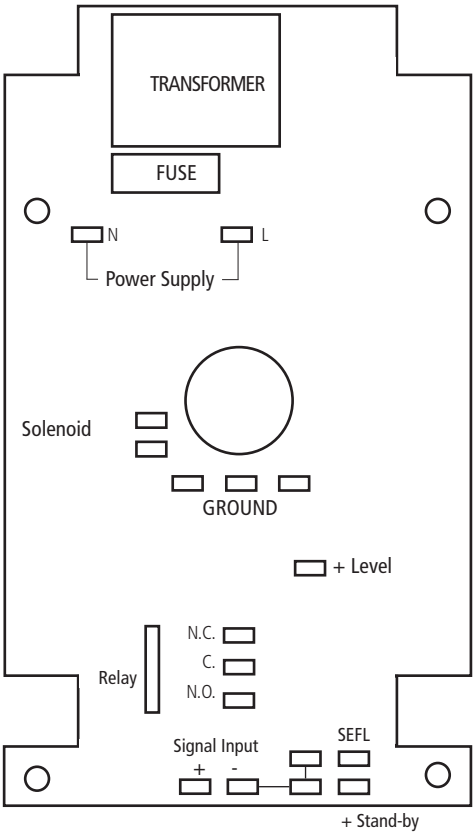
- Remove board's screws.

- Completely disconnect wires from main board and replace it. Reinsert screws.

- Reconnect wires to the main board (see enclosed picture).

- Reassemble the pump. Be careful to put back the knob's spring.

- Reinsert screws.


TRANSFORMER
FUSE
N
L
Power Supply
Solenoid
GROUND
+ Level
N.C.
C.
N.O.
Relay
Signal Input
+
-
SEFL
+ Stand-by

ATTENTION

To ensure safety requirements of drinking water treated and the maintenance of the imrpovements as declared by the manufacturer, pump must be checked once for month.

Wear needed safety devices and check hoses and all hydraulic components for:

- product leak
- broken hoses
- corroded connections

All maintenance operations must be performed by authorized and trained personnel only. If pump needs factory assistance please use original package to return it.

Before to do it, please, remove all dosing product inside the pump and hoses.

Use only original spare parts!

Recommended Chemicals Table

Chemical Product	*Formula*	*Maximum % Concentration*
Hydrochloric Acid	**HCl**	33%
Sulphuric Acid	**H_2SO_4**	96%
Sodium Bisulphate	**$NaHSO_4$**	37%
Sodium Chlorite	**$Na\ ClO_2$**	30%
Sodium Hypochlorite	**Na OCl**	13,5%
Calcium Hypochlorite	**$Ca\ (ClO)_2$**	2%
Dichloroisocyanuric Sodium	**$(CON)_3\ Cl\ Na$**	4%
Alluminium Sulphate	**$Al_2\ (SO_4)_3$**	18%
Ferric Chloride	**$Fe\ Cl_3$**	40%

B APPENDIX. CONSTRUCTION MATERIALS AND TECHNICAL INFO

TECHNICAL FEATURES

Power supply:	230 VAC (190-265 VAC)
Power supply:	115 VAC (90-135 VAC)
Power supply:	24 VAC (20-32 VAC)
Power supply:	12 VDC (10-16 VDC)
Pump Strokes:	0 ÷ 180 (0 ÷ 140 for KMS AC MF)
Suction Height:	1,5 metres
Environment Temperature:	0 ÷ 45°C (32 ÷ 113°F)
Chemical Temperature:	0 ÷ 50°C (32 ÷ 122°F)
Installation Class:	II
Pollution Level:	2
Audible Noise:	74dbA
Packaging and Transporting Temperature:	-10 ÷ 50°C (14 ÷ 122°F)
Protection degree:	IP 65

MANUFACTURING MATERIALS

Case:	PP
Pump head:	PVDF, Acrilic, SS *
Diaphragm:	PTFE
Balls:	CERAMIC, PTFE, SS *
Suction Pipe	PVC
Delivery Pipe:	PVDF
Valve Body:	PVDF, PE, SS *
O-ring:	FP, EP, PTFE *
Injection connector	PVDF (ceramic, HASTELLOY C276 spring)
Level Probe:	PVDF
Level probe cable:	PE
Foot Filter:	PVDF

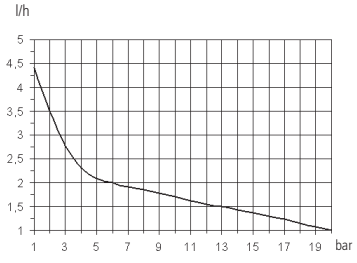
*as ordered.

INFORMATION								
	Flow				**cc per stroke**		**max pressure**	
	Min cc/h	**Max l/h**	**Min GPH**	**Max GPH**	**Min**	**Max**		
2001	0.03	1	0.000008	0.26	0.03	0.09	20 bar	290 PSI
1802	0.06	2	0.000016	0.53	0.06	0.19	18 bar	261 PSI
1504	0.11	4	0.000029	1.06	0.11	0.37	15 bar	217 PSI
1005	0.14	5	0.000037	1.32	0.14	0.46	10 bar	145 PSI
0808	0.22	8	0.000058	2.11	0.22	0.74	8 bar	116 PSI
0510	0.28	10	0.000074	2.64	0.28	0.93	5 bar	72 PSI
0218	0.50	18	0.00013	4.76	0.50	1.67	2 bar	29 PSI
INFORMATION SELF VENTING MODELS								
200.5	0.015	0.5	$4x10^{-6}$	0.13	0.015	0.05	20 bar	290PSI
1801	0.03	1	0.000008	0.26	0.03	0.09	18 bar	261 PSI
1503	0.08	3	0.000021	0.79	0.08	0.28	15 bar	217 PSI
103,5	0.10	3.5	0.000026	0.92	0.10	0.32	10 bar	145 PSI
085,5	0.15	5,5	0.000040	1.45	0.15	0.51	8 bar	116 PSI
057,5	0.21	7.5	0.000055	1.98	0.21	0.69	5 bar	72 PSI

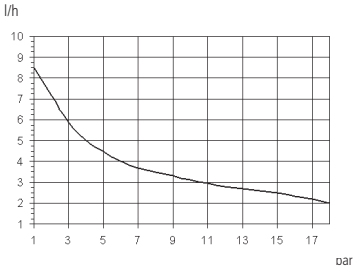
C APPENDIX. DELIVERY CURVES

Flow rate indicated is for H_2O at 20°C at the rated pressure. Dosing accuracy ± 2% at constant pressure ± 0,5 bar.

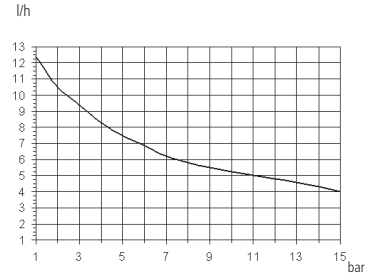
2001: l/h 01 bar 20
Pump head mod. I



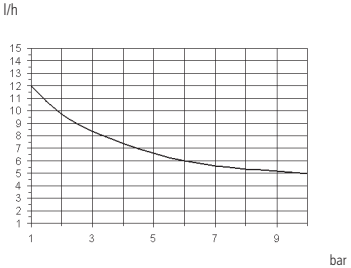
1802: l/h 2 bar 18
Pump head mod. L



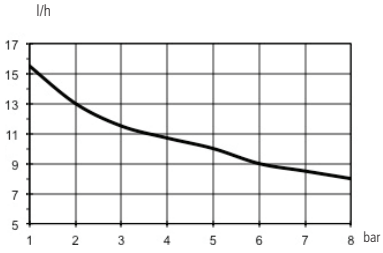
1504: l/h 4 bar 15
Pump head mod. L



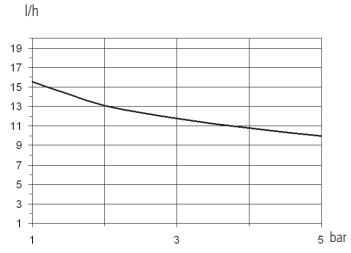
1005: l/h 5 bar 10
Pump head mod. L



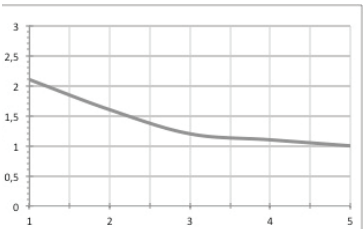
0808: l/h 8 bar 8
Pump head mod. L



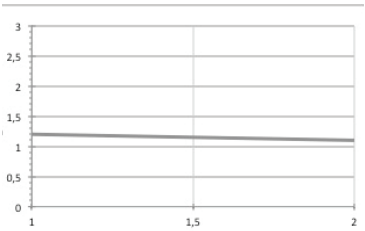
0510: l/h 10 bar 5
Pump head mod. L



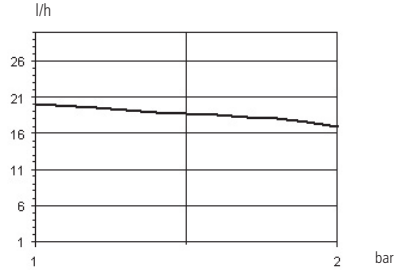
0501: l/h 1 bar 5
Pump head mod. I



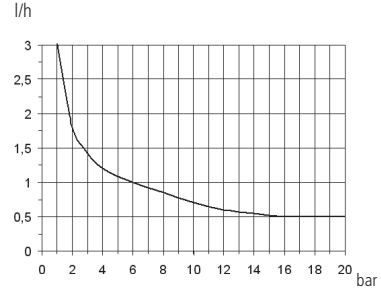
0301: l/h 1 bar 3
Pump head mod. I



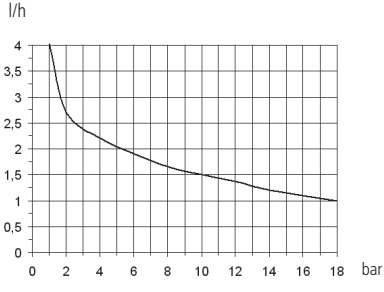
0218: l/h 18 bar 2
Pump head mod. M



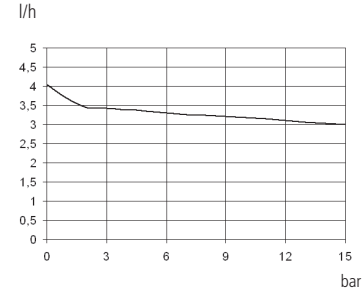
200,5: l/h 20 bar 0,5
Pump head mod. IA



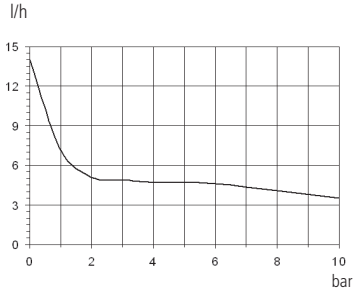
1801: l/h 1 bar 18
Pump head mod. LA



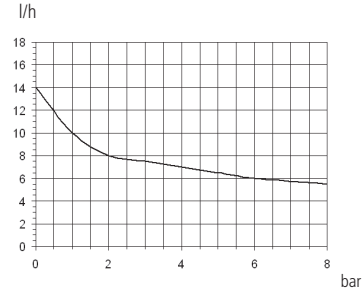
1503: l/h 3 bar 15
Pump head mod. LA



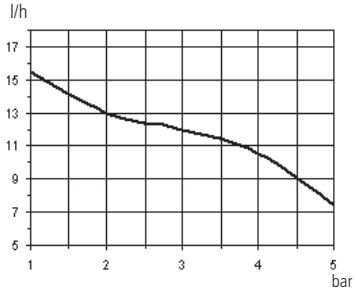
103,5: l/h 3,5 bar 10
Pump head mod. LA



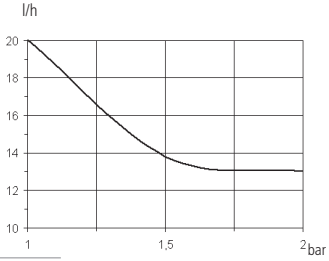
085,5: l/h 5,5 bar 8
Pump head mod. LA



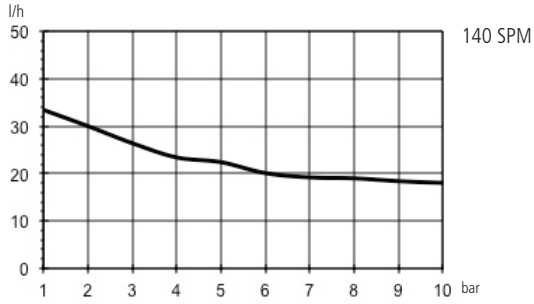
057,5,5: l/h 7,5 bar 5
Pump head mod. LA



0213: l/h 13 bar 2
Pump head mod. MA

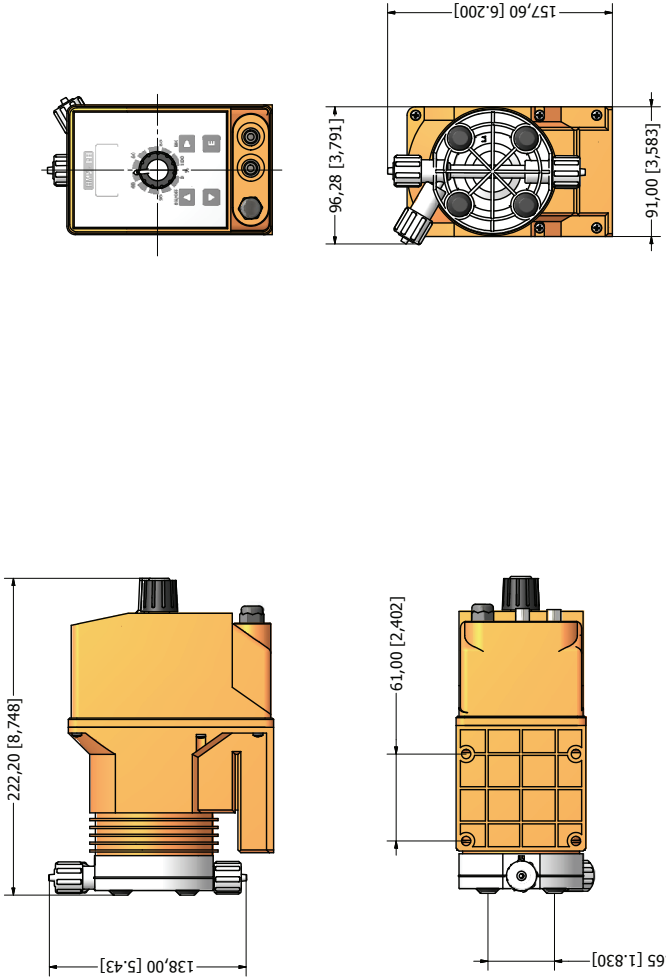


1018: l/h 18 bar 10
Pump head mod. M



bold : mm
( ) : inches

Dimensions



E APPENDIX. CHEMICAL COMPATIBILITY TABLE

Solenoid driven metering pumps are widely used to dose chemical fluids and it is important that the most suitable material in contact with fluid is selected for each application. This compatibility table serves as a useful help in this respect. All the informations in this list are verified periodically and believed to be correct on the date of issuance. All the informations in this list are based on manufacturer's data and its own experience but since the resistance of any material depends by several factors this list is supplied only as an initial guide, in no way EMEC makes warranties of any matter respect to the informations provided in this list.

Product	Formula	Ceram.	PVDF	PP	PVC	SS 316	PMMA	Hastel.	PTFE	FPM	EPDM	NBR	PE
Acetic Acid, Max 75%	CH3COOH	2	1	1	1	1	3	1	1	3	1	3	1
Hydrochloric Acid, Concentrate	HCl	1	1	1	1	3	1	1	1	1	3	3	1
Hydrofluoric Acid 40%	H2F2	3	1	3	2	3	3	2	1	1	3	3	1
Phosphoric Acid, 50%	H3PO4	1	1	1	1	2	1	1	1	1	1	3	1
Nitric Acid, 65%	HNO3	1	1	2	3	2	3	1	1	1	3	3	2
Sulphuric Acid, 85%	H2SO4	1	1	1	1	2	3	1	1	1	3	3	1
Sulphuric Acid, 98.5%	H2SO4	1	1	3	3	3	3	1	1	1	3	3	3
Amines	R-NH2	1	2	1	3	1	-	1	1	3	3	1	1
Sodium Bisulphite	NaHSO3	1	1	1	1	2	1	1	1	1	1	1	1
Sodium Carbonate (Soda)	Na2CO3	2	1	1	1	1	1	1	1	2	1	1	1
Ferric Chloride	FeCl3	1	1	1	1	3	1	1	1	1	1	1	1
Calcium Hydroxide (Slaked Lime)	Ca(OH)2	1	1	1	1	1	1	1	1	1	1	1	1
Sodium Hydroxide (Caustic Soda)	NaOH	2	3	1	1	1	1	1	1	2	1	2	1
Calcium Hypochlor.(Chlor.ted Lime)	Ca(OCl)2	1	1	1	1	3	1	1	1	1	1	3	1
Sodium Hypochlorite, 12.5%	NaOCl + NaCl	1	1	2	1	3	1	1	1	1	1	2	3
Potassium Permanganate, 10%	KMnO4	1	1	1	1	1	1	1	1	1	1	3	1
Hydrogen Peroxide, 30% (Perydrol)	H2O2	1	1	1	1	1	3	1	1	1	3	3	1
Aluminium Sulphate	Al2(SO4)3	1	1	1	1	1	1	1	1	1	1	1	1
Copper-II-Sulphate (Roman Vitriol)	CuSO4	1	1	1	1	1	1	1	1	1	1	1	1

Resistance rating

Resistant	1
Fairly resistant	2
Not resistant	3

Materials

Polyvinyldene fluoride	PVDF	Pump Heads, valves, fitting, tubing
Polypropylene	PP	Pump Heads, valves, fitting, level floater
PVC	PVC	Pump Heads
Stainless steel	SS 316	Pump Heads, valves
Polymethyl Metacrilate (Acrylic)	PMMA	Pump Heads
Hastelloy C-276	Hastelloy	Injection valve spring
Polytetrafluoroethylene	PTFE	Diaphragm
Fluorocarbon (Viton® B)	FPM	Sealings
Ethylene propylene	EPDM	Sealings
Nitrile	NBR	Sealings
Polyethylene	PE	Tubing

F APPENDIX. HOSES RESISTANCE TABLE

Hose features are very important for a reliable dosage. Every pump's model is made to work in the best way using selected hoses according to pump's capacity / model. Information reported here are intended for standard use only. For extended information ask to hose's manufacturer.

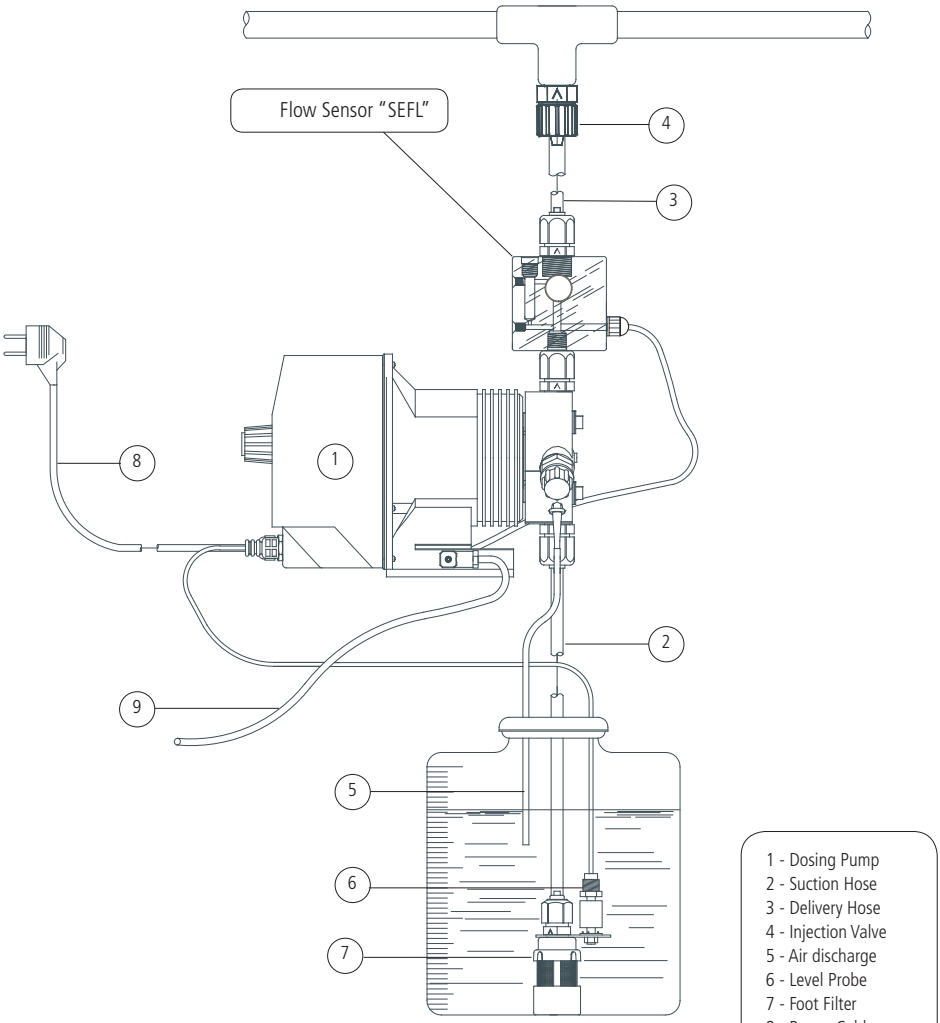
Suction / Delivery Hose			
4x6 mm PVC (transparent)	4x8 mm PE (opaque)	6x8 mm PE (opaque)	8x12 mm PVC (transparent)

Delivery Hose	Working Pressure				Breaking Pressure			
4x6 mm PE 230 (opaque)	20°C 12 bar	30°C 10.5 bar	40°C 8.5 bar	50°C 6.2 bar	20°C 36 bar	30°C 31.5 bar	40°C 25.5 bar	50°C 18.5 bar
4x8 mm PE 230 (opaque)	20°C 19 bar	30°C 15.7 bar	40°C 12 bar	50°C 7.5 bar	20°C 57 bar	30°C 47 bar	40°C 36 bar	50°C 22.5 bar
6x8 mm PE 230 (opaque)	20°C 8.6 bar	30°C 6.8 bar	40°C 4.8 bar	50°C 2.3 bar	20°C 26 bar	30°C 20.5 bar	40°C 14.5 bar	50°C 7 bar
8x12 mm PE 230 (opaque)	20°C 12 bar	30°C 10.5 bar	40°C 8.5 bar	50°C 6.2 bar	20°C 36 bar	30°C 31.5 bar	40°C 25.5 bar	50°C 18.5 bar
4x6 mm PVDF Flex 2800 (opaque)	20°C 40 bar	30°C 34 bar	40°C 30 bar	50°C 27 bar	60°C 24.8 bar	80°C 20 bar	90°C 10 bar	
6x8 mm PVDF Flex 2800 (opaque)	20°C 29 bar	30°C 25.5 bar	40°C 22 bar	50°C 20 bar	60°C 18 bar	80°C 14.5 bar	90°C 7.3 bar	
8X10 mm PVDF Flex 2800 (opaque)	20°C 18 bar	30°C 15.5 bar	40°C 13.5 bar	50°C 12.5 bar	60°C 11.2 bar	80°C 9 bar	90°C 4.5 bar	
1/4 PE 230 (opaque)	20°C 17.6 bar							
3/8 PE 230 (opaque)	20°C 10.6 bar							
1/2 PE 230 (opaque)	20°C 10.6 bar							

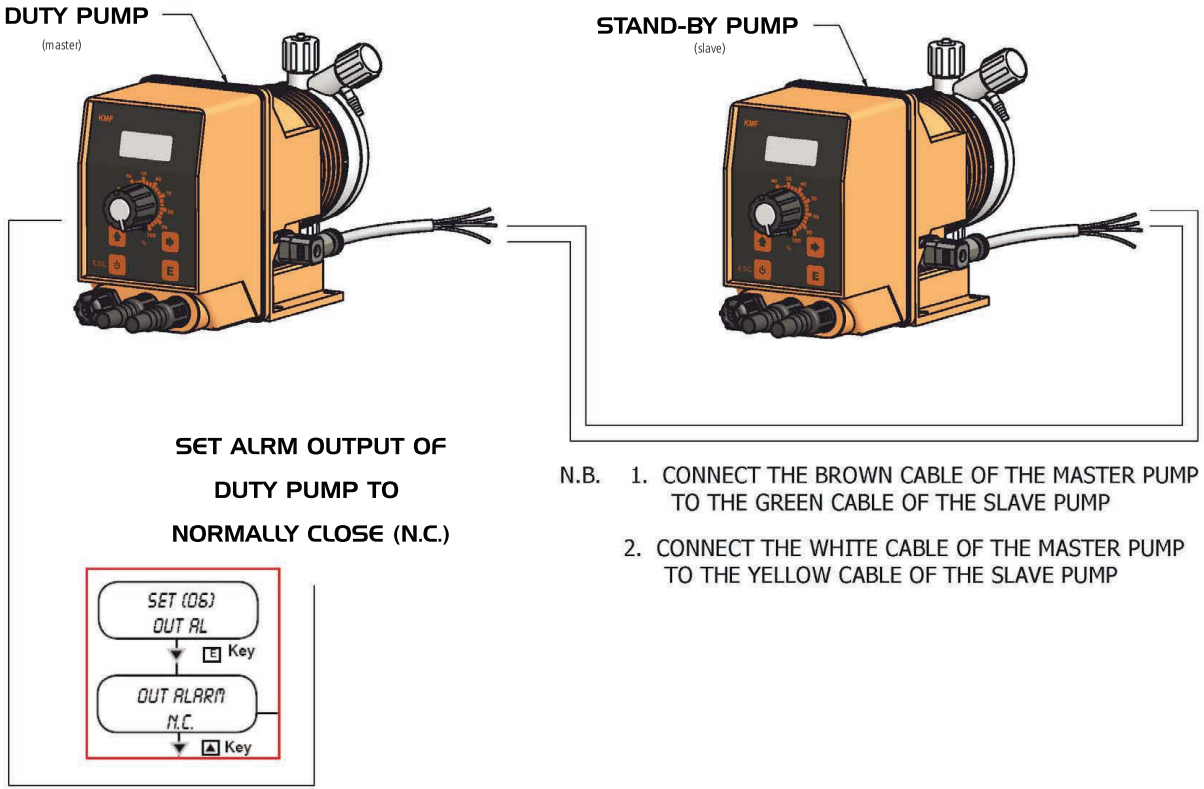
G APPENDIX. "SEFL" INSTALLATION

Connect SEFL flow sensor as shown.

For a proper installation please put SEFL "signal wire" perpendicularly to pump's solenoid.



CONNECT ALARM OUTPUT WIRES OF DUTY PUMP TO STAND-BY INPUT OF STAND-BY PUMP



N.B. 1. CONNECT THE BROWN CABLE OF THE MASTER PUMP TO THE GREEN CABLE OF THE SLAVE PUMP

2. CONNECT THE WHITE CABLE OF THE MASTER PUMP TO THE YELLOW CABLE OF THE SLAVE PUMP

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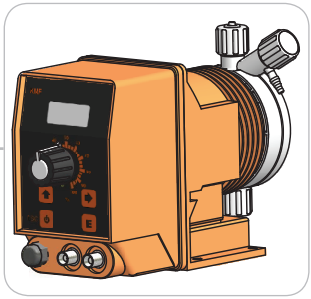

REUSE
REDUCE
RECYCLE

When dismantling a pump please separate material types and send them according to local recycling disposal requirements.
We appreciate your efforts in supporting your local Recycle Environmental Program.
Working together we'll form an active union to assure the world's invaluable resources are conserved.